THE

AMERICAN EPHEMERIS

AND

NAUTICAL ALMANAC

FOR THE YEAR

1886.

FIRST EDITION.

PUBLISHED IN COMPLIANCE WITH A JOINT RESOLUTION OF THE FORTY-SIXTH CONGRESS.

WASHINGTON:
BUREAU OF NAVIGATION.
1883.

JOINT RESOLUTION

FOR PRINTING THE AMERICAN EPHEMERIS AND NAUTICAL ALMANAC.

Resolved by the Senate and House of Representatives of the United States of America in Congress assembled, That there shall be printed annually at the Government Printing Office fifteen hundred copies of the American Ephemeris and Nautical Almanac and of the papers supplementary thereto, of which one hundred shall be for the use of the Senate, four hundred for the House of Representatives, and one thousand for the public service, to be distributed by the Navy Department.

Sec. 2. That additional copies of the Ephemeris and of the Nautical Almanac extracted therefrom may be ordered by the Secretary of the Navy for sale: Provided, That all moneys received from such sale shall be deposited in the Treasury to the credit of the appropriation for public printing.

Approved, February 11, 1880.

PREFACE.

The contents of the present volume of *The American Ephemeris* are, in general, similar to those of the volume for the preceding year. Beginning with the volume for the year 1882, the arrangement of the work is as follows:—

Part I, *Ephemeris for the Meridian of Greenwich*, gives the positions of the major planets, and other fundamental astronomical data for equidistant intervals of Greenwich mean time.

Part II, *Ephemeris for the Meridian of Washington*, gives the ephemerides of the fixed stars, sun, moon, and major planets for transit over the meridian of Washington. The mean places of the fixed stars and data for their reduction are also included in this Part. The list of mean and apparent places of fixed stars has been greatly enlarged, for the convenience of field-astronomers.

Part III, *Phenomena*, contains predictions of phenomena to be observed, with data for their computation. Washington mean time is used in this part except in a few cases, notably that of eclipses, where Greenwich mean time was judged more convenient. The additions comprise more complete data for eclipses of the sun, diagrams showing the configurations of the satellites of Jupiter, data respecting the disks of Mercury and Venus for the reduction of meridian and photometric observations, and diagrams, with tables, for identifying any known satellites of other planets.

SIMON NEWCOMB,

Professor U. S. Navy, Superintendent.

WASHINGTON, *February*, 1883.

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CORRECTIONS.

EPHEMERIS FOR 1883 (FIRST EDITION).

Page 167,	Oct. 9,	Semidiameter at noon,	*for* 15′ 19″.1	*read* 15′ 19″.9
293,	σ Andromedæ,	Declination,	" $+35°$	" $+36°$
295,	ζ Geminorum,	Right Ascension,	" $10^s.454$	" $10^s.184$
	Annual variation in	Right Ascension,	" $+3.6527$	" $+3.5627$
297,	ξ Hydræ,	Declination,	" 17″.76	" 37″.76
299,	δ Aræ,	Declination,	" 65°	" 60°
301,	74 Cygni,	Ann. Var. R. A.,	" $7^s.4010$	" $2^s.4010$
301,	δ Sculptoris,	Declination,	" 58°	" 28°
380,	Dec. 32,	R. A. of Centre,	" $42^s.14$	" $44^s.14$

465, The conjunctions and elongations of Japetus should read as follows:—

JAPETUS					
	Superior Conjunction .	Jan. 16	June 29	Sept. 16	Dec. 4
	East Elongation . . .	Feb. 6	July 19	Oct. 6	Dec. 23
	Inferior Conjunction . .	Feb. 26	Aug. 8	Oct. 26	
	West Elongation . . .	June 9	Aug. 28	Nov. 15	

474,	line three,	*for* $356\frac{1}{4}$	*read* $365\frac{1}{4}$
495,	line nine from bottom,	" $\sin\psi$	" $\cos\psi$
498,	line ten,	" $Q+P$	" $180°-Q-P$
498,	line eleven,	" $Q-P$	" $180°-Q+P$

Ephemeris for 1884 (*First Edition*).

Page 293,	σ Andromedæ,	Declination,	*for* $+35°$	*read* $+36°$
294,	σ Arietis,	Ann. Var. R. A.,	" $+3^s.3057$	" $+3^s.3036$
295,	ζ Geminorum,	Right Ascension,	" $14^s.108$	" $13^s.747$
	Annual variation in	Right Ascension,	" $+3.6527$	" $+3.5627$
297,	ξ Hydræ,	Declination,	" 37″.64	" 57″.64
315,	α Cassiopeæ,	Dec. 34.2, Declination,	" 88″.9	" 98″.9
339,	η Bootis,	Dec. 34.8, R. A.,	" $11^s.24$	" $12^s.24$

Ephemeris for 1885 (*First Edition*).

Page 249, last line in last column, *for* 8 30.7 *read* 8 30.8

325, 22 Camelop. (H.), R. A. opposite Oct. 5.7, " .74 " .76

Delete - .07 opposite Dec. 34.5 and move column from Oct. 5.7, inclusive, down one line.

375, fifth column, *for* o^1 Cygni *read* 31 Cygni

408—409, Declination of Neptune from Sept. 1 to Dec. 32, both included, to be increased *one* degree.

417, Third column, second line, remove E to third line.

453, Diagram of Jupiter's Satellites, reverse direction of arrows.

The American Nautical Almanac for 1886 (*First Edition*).

Page 253, Eclipse Charts, first line, *for* August 8—9 *read* August 28—9.

261, Twenty-third line, " $21^h\,5^m\,57^s.4$ " $21^h\,6^m\,55^s.06$

CHRONOLOGICAL ERAS AND CYCLES.

CHRONOLOGICAL ERAS.

THE YEAR 1886, WHICH COMPRISES THE LATTER PART OF THE 110TH AND THE BEGINNING OF THE 111TH YEAR OF THE INDEPENDENCE OF THE UNITED STATES OF AMERICA, CORRESPONDS TO—

The year 6599 of the Julian Period;
" 7394–95 of the Byzantine era, the year 7395 commencing on September 1st;
" 5646–47 of the Jewish era, the year 5647 commencing on September 30th, or, more exactly, at sunset on September 29th;
" 2639 since the foundation of Rome, according to VARRO;
" 2633 since the beginning of the era of NABONASSAR, which has been assigned to Wednesday, the 26th of February of the 3967th year of the Julian Period: corresponding, in the notation of chronologists, to the 747th; and, in the notation of astronomers, to the 746th year before the birth of CHRIST;
" 2662 of the Olympiads, or the second year of the 666th Olympiad commencing in July, 1886, if we fix the era of the Olympiads at 775½ years before CHRIST, or near the beginning of July of the year 3938 of the Julian Period;
" 2198 of the Grecian era, or the era of the Seleucidæ;
" 1602 of the era of DIOCLETIAN.
" 2546 of the Japanese era and to the 19th year of the period entitled "Meiji."

The year 1304 of the Mohammedan era, or the era of the Hegira, begins on the 30th day of September, 1886.

The first day of January of the year 1886 is the 2,409,908th day since the commencement of the Julian Period.

CHRONOLOGICAL CYCLES.

Dominical Letter	C	Solar Cycle	19
Epact	25	Roman Indiction	14
Lunar Cycle or Golden Number	6	Julian Period	6599

SYMBOLS AND ABBREVIATIONS.

SIGNS OF THE PLANETS, ETC.

☉	The Sun.	♂	Mars.
☾	The Moon.	♃	Jupiter.
☿	Mercury.	♄	Saturn.
♀	Venus.	♅	Uranus.
⊕	The Earth.	♆	Neptune.

SIGNS OF THE ZODIAC.

Spring Signs.	1.	♈	Aries.	Autumn Signs.	7.	♎	Libra.
	2.	♉	Taurus.		8.	♏	Scorpius.
	3.	♊	Gemini.		9.	♐	Sagittarius
Summer Signs.	4.	♋	Cancer.	Winter Signs.	10.	♑	Capricornus.
	5.	♌	Leo.		11.	♒	Aquarius.
	6.	♍	Virgo.		12.	♓	Pisces.

ASPECTS.

☌ Conjunction, or having the same Longitude or Right Ascension.
□ Quadrature, or differing 90° in Longitude or Right Ascension.
☍ Opposition, or differing 180° in Longitude or Right Ascension.

ABBREVIATIONS.

☊	Ascending Node.	°	Degrees.
☋	Descending Node.	′	Minutes of Arc.
N.	North.	″	Seconds of Arc.
S.	South.	h	Hours.
E.	East.	m	Minutes of Time.
W.	West.	s	Seconds of Time.

PART I.

ASTRONOMICAL EPHEMERIS

FOR THE

MERIDIAN OF GREENWICH.

GREENWICH MEAN TIME.

THE MOON'S

Day of the Month.	SEMIDIAMETER. Noon.	SEMIDIAMETER. Midnight.	HORIZONTAL PARALLAX. Noon.	HORIZONTAL PARALLAX. Diff. for 1 Hour.	HORIZONTAL PARALLAX. Midnight.	HORIZONTAL PARALLAX. Diff. for 1 Hour.	UPPER TRANSIT. Meridian of Greenwich.	UPPER TRANSIT. Diff. for 1 Hour.	AGE. Noon.
	′ ″	′ ″	′ ″	″	′ ″	″	h m	m	d
1	15 7.3	15 3.5	55 22.8	−1.19	55 9.1	−1.09	21 47.3	2.02	25.9
2	15 0.1	14 57.1	54 56.6	0.99	54 45.3	0.89	22 35.8	2.02	26.9
3	14 54.3	14 51.9	54 35.3	0.80	54 26.3	0.70	23 24.2	2.01	27.9
4	14 49.8	14 47.9	54 18.5	−0.60	54 11.8	−0.51	6		28.9
5	14 46.4	14 45.3	54 6.3	0.41	54 2.0	0.31	0 12.1	1.98	0.2
6	14 44.4	14 43.9	53 58.9	−0.20	53 57.1	−0.09	0 59.1	1.93	1.2
7	14 43.8	14 44.1	53 56.7	+0.03	53 57.8	+0.16	1 44.9	1.88	2.2
8	14 44.9	14 46.1	54 0.5	0.30	54 5.0	0.45	2 29.6	1.84	3.2
9	14 47.8	14 50.1	54 11.3	0.61	54 19.6	0.78	3 13.3	1.81	4.2
10	14 52.9	14 56.2	54 29.9	+0.95	54 42.3	+1.13	3 56.5	1.80	5.2
11	15 0.2	15 4.8	54 57.0	1.32	55 13.9	1.50	4 39.9	1.82	6.2
12	15 10.0	15 15.8	55 33.0	1.68	55 54.3	1.86	5 24.1	1.87	7.2
13	15 22.2	15 29.0	56 17.6	+2.02	56 42.8	+2.17	6 10.0	1.96	8.2
14	15 36.4	15 44.0	57 9.7	2.30	57 37.9	2.39	6 58.4	2.08	9.2
15	15 52.0	16 0.0	58 7.0	2.44	58 36.5	2.45	7 50.1	2.23	10.2
16	16 8.0	16 15.7	59 5.7	+2.40	59 34.1	+2.30	8 45.5	2.39	11.2
17	16 23.0	16 29.7	60 0.9	2.14	60 25.4	1.91	9 44.5	2.52	12.2
18	16 35.5	16 40.3	60 46.8	1.63	61 4.4	1.28	10 45.9	2.59	13.2
19	16 43.8	16 46.1	61 17.5	+0.90	61 25.9	+0.48	11 48.3	2.59	14.2
20	16 47.0	16 46.4	61 29.1	+0.05	61 27.0	−0.39	12 49.7	2.52	15.2
21	16 44.4	16 41.2	61 19.7	−0.80	61 7.7	1.19	13 48.8	2.40	16.2
22	16 36.7	16 31.1	60 51.2	−1.53	60 30.9	−1.82	14 45.1	2.28	17.2
23	16 24.8	16 17.8	60 7.6	2.05	59 41.8	2.21	15 38.6	2.18	18.2
24	16 10.3	16 2.6	59 14.5	2.32	58 46.2	2.37	16 29.8	2.10	19.2
25	15 54.9	15 47.2	58 17.6	−2.37	57 49.3	−2.33	17 19.5	2.04	20.2
26	15 39.7	15 32.5	57 21.8	2.25	56 55.4	2.14	18 8.3	2.02	21.2
27	15 25.7	15 19.4	56 30.5	2.01	56 7.3	1.86	18 56.6	2.01	22.2
28	15 13.6	15 8.3	55 46.0	−1.69	55 26.7	−1.53	19 44.9	2.01	23.2
29	15 3.6	14 59.4	55 9.3	1.37	54 53.9	1.20	20 33.2	2.00	24.2
30	14 55.8	14 52.6	54 40.6	1.03	54 29.1	0.88	21 21.1	1.99	25.2
31	14 50.0	14 47.9	54 19.5	0.73	54 11.6	0.59	22 9.2	1.97	26.2
32	14 46.2	14 44.9	54 5.4	−0.45	54 0.7	−0.33	22 56.3	1.93	27.2

GREENWICH MEAN TIME.

THE MOON'S RIGHT ASCENSION AND DECLINATION.

FRIDAY 1.

Hour	Right Ascension	Diff. for 1 Minute	Declination	Diff. for 1 Minute
0	[illegible]	[illegible]	[illegible]	[illegible]
1	[illegible]	[illegible]	[illegible]	[illegible]
2	[illegible]	[illegible]	[illegible]	[illegible]
3	[illegible]	[illegible]	[illegible]	[illegible]
4	[illegible]	[illegible]	[illegible]	[illegible]
5	[illegible]	[illegible]	[illegible]	[illegible]
6	[illegible]	[illegible]	[illegible]	[illegible]
7	[illegible]	[illegible]	[illegible]	[illegible]
8	[illegible]	[illegible]	[illegible]	[illegible]
9	[illegible]	[illegible]	[illegible]	[illegible]
10	[illegible]	[illegible]	[illegible]	[illegible]
11	[illegible]	[illegible]	[illegible]	[illegible]
12	[illegible]	[illegible]	[illegible]	[illegible]
13	[illegible]	[illegible]	[illegible]	[illegible]
14	[illegible]	[illegible]	[illegible]	[illegible]
15	[illegible]	[illegible]	[illegible]	[illegible]
16	[illegible]	[illegible]	[illegible]	[illegible]
17	[illegible]	[illegible]	[illegible]	[illegible]
18	[illegible]	[illegible]	[illegible]	[illegible]
19	[illegible]	[illegible]	[illegible]	[illegible]
20	[illegible]	[illegible]	[illegible]	[illegible]
21	[illegible]	[illegible]	[illegible]	[illegible]
22	[illegible]	[illegible]	[illegible]	[illegible]
23	[illegible]	[illegible]	[illegible]	[illegible]

SATURDAY 2.

Hour	Right Ascension	Diff. for 1 Minute	Declination	Diff. for 1 Minute
0	[illegible]	[illegible]	[illegible]	[illegible]
1	[illegible]	[illegible]	17 [illegible]	[illegible]
2	[illegible]	[illegible]	[illegible]	[illegible]
3	[illegible]	[illegible]	17 [illegible]	[illegible]
4	[illegible]	[illegible]	17 [illegible]	[illegible]
5	[illegible]	[illegible]	17 [illegible]	[illegible]
6	[illegible]	[illegible]	17 [illegible]	[illegible]
7	[illegible]	[illegible]	17 [illegible]	[illegible]
8	[illegible]	[illegible]	17 [illegible]	[illegible]
9	[illegible]	[illegible]	17 [illegible]	[illegible]
10	17 [illegible]	[illegible]	17 [illegible]	[illegible]
11	17 [illegible]	[illegible]	17 [illegible]	[illegible]
12	17 [illegible]	[illegible]	17 [illegible]	[illegible]
13	17 [illegible]	[illegible]	17 [illegible]	[illegible]
14	17 [illegible]	[illegible]	17 [illegible]	[illegible]
15	17 [illegible]	[illegible]	17 [illegible]	[illegible]
16	17 [illegible]	[illegible]	17 [illegible]	[illegible]
17	17 [illegible]	[illegible]	18 [illegible]	[illegible]
18	17 [illegible]	[illegible]	18 [illegible]	[illegible]
19	17 [illegible]	[illegible]	18 [illegible]	[illegible]
20	17 [illegible]	[illegible]	18 [illegible]	[illegible]
21	17 [illegible]	[illegible]	18 [illegible]	[illegible]
22	17 [illegible]	[illegible]	18 11 [illegible]	[illegible]
23	17 [illegible]	[illegible]	18 13 [illegible]	[illegible]
24	17 [illegible]	[illegible]	S. 18 15 [illegible]	1.744

SUNDAY 3.

Hour	Right Ascension	Diff. for 1 Minute	Declination	Diff. for 1 Minute
0	17 30 39.53	2.211	S. 18 15 0.2	1.744
1	17 32 [illegible]	2.209	18 16 [illegible]	1.656
2	17 34 [illegible]	2.207	18 18 [illegible]	1.568
3	17 37 [illegible]	2.204	18 19 50.3	1.480
4	17 39 [illegible]	2.201	18 21 16.5	1.392
5	17 41 [illegible]	2.198	18 22 37.4	1.304
6	17 43 [illegible]	2.196	18 23 53.0	1.216
7	17 45 30.?2	2.191	18 25 3.3	1.127
8	17 47 [illegible]	2.187	18 26 [illegible]	1.039
9	17 49 [illegible]	[illegible]	18 27 [illegible]	[illegible]
10	17 51 [illegible]	[illegible]	18 28 [illegible]	[illegible]
11	17 5? [illegible]	[illegible]	18 28 51.7	[illegible]
12	17 56 [illegible]	2.168	18 29 35.5	[illegible]
13	17 58 [illegible]	2.162	18 30 14.2	[illegible]
14	18 1 [illegible]	2.157	18 30 47.5	[illegible]
15	18 3 [illegible]	[illegible]	18 31 15.6	[illegible]
16	18 4 [illegible]	2.145	18 31 38.4	[illegible]
17	18 [illegible]	[illegible]	18 31 55.9	[illegible]
18	18 [illegible] 47.4	2.132	18 32 8.1	[illegible]
19	18 [illegible]	[illegible]	18 32 15.1	[illegible]
20	18 [illegible]	[illegible]	18 32 16.5	−0.116
21	18 15 7.31	[illegible]	18 32 13.2	[illegible]
22	18 17 [illegible]	[illegible]	18 32 4.4	[illegible]
23	18 19 30.32	2.093	S. 18 31 50.4	[illegible]

MONDAY 4.

Hour	Right Ascension	Diff. for 1 Minute	Declination	Diff. for 1 Minute
0	18 21 37.?6	2.085	S. 18 31 31.1	0.385
1	18 23 [illegible]	2.076	18 31 6.6	0.452
2	18 25 [illegible]	2.067	18 30 36.?	0.539
3	18 27 46.34	2.057	18 30 [illegible]	0.626
4	18 29 52.?5	2.047	18 29 [illegible]	0.712
5	18 31 58.4?	[illegible]	18 28 36.5	0.798
6	18 34 5.1?	[illegible]	18 27 46.?	0.885
7	18 36 11.??	[illegible]	18 26 50.3	0.971
8	18 38 17.3?	2.1008	18 25 49.5	1.057
9	18 40 23.3?	2.0994	18 24 43.5	1.142
10	18 42 29.23	2.0982	18 23 32.4	1.228
11	18 44 35.1?	2.0972	18 22 16.1	1.314
12	18 46 40.??	2.0960	18 20 54.7	1.399
13	18 48 46.?2	2.0948	18 19 28.2	1.484
14	18 50 52.27	2.0936	18 17 56.?	1.568
15	18 52 57.85	2.0922	18 16 20.?	1.652
16	18 55 3.35	2.09?	18 14 38.3	1.737
17	18 57 8.77	2.0897	18 12 51.?	1.821
18	18 59 14.12	2.0884	18 10 [illegible]	1.905
19	19 1 19.38	2.0870	18 9 3.?	1.988
20	19 3 24.56	2.0857	18 7 1.2	2.072
21	19 5 2?.?6	2.0843	18 4 54.4	2.155
22	19 7 34.67	2.0829	18 2 42.6	2.237
23	19 9 39.?0	2.0814	18 0 25.9	2.319
24	19 11 44.44	2.0799	S. 17 58 4.3	2.402

GREENWICH MEAN TIME.

THE MOON'S RIGHT ASCENSION AND DECLINATION.

SATURDAY 9.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
	h m s	s	° ′ ″	″
0	22 23 23.03	1.9220	S. 8 47 55.1	8.348
1	22 25 18.32	1.9211	8 39 33.1	8.386
2	22 27 13.56	1.9202	8 31 8.8	8.424
3	22 29 8.75	1.9194	8 22 42.2	8.461
4	22 31 3.89	1.9187	8 14 13.4	8.498
5	22 32 58.99	1.9179	8 5 42.4	8.535
6	22 34 54.04	1.9172	7 57 9.2	8.571
7	22 36 49.05	1.9165	7 48 33.9	8.606
8	22 38 44.02	1.9158	7 39 56.5	8.640
9	22 40 38.95	1.9152	7 31 17.1	8.674
10	22 42 33.85	1.9147	7 22 35.6	8.708
11	22 44 28.71	1.9141	7 13 52.1	8.742
12	22 46 23.54	1.9136	7 5 6.6	8.774
13	22 48 18.34	1.9132	6 56 19.2	8.806
14	22 50 13.12	1.9128	6 47 29.9	8.838
15	22 52 7.88	1.9125	6 38 38.6	8.870
16	22 54 2.62	1.9121	6 29 45.5	8.900
17	22 55 57.33	1.9117	6 20 50.6	8.930
18	22 57 52.02	1.9114	6 11 53.9	8.959
19	22 59 46.70	1.9112	6 2 55.5	8.988
20	23 1 41.37	1.9111	5 53 55.3	9.017
21	23 3 36.03	1.9109	5 44 53.4	9.046
22	23 5 30.68	1.9108	5 35 49.8	9.073
23	23 7 25.33	1.9108	S. 5 26 44.6	9.100

SUNDAY 10.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
0	23 9 19.98	1.9108	S. 5 17 37.8	9.127
1	23 11 14.63	1.9108	5 8 29.4	9.152
2	23 13 9.28	1.9108	4 59 19.5	9.177
3	23 15 3.93	1.9109	4 50 8.1	9.202
4	23 16 58.59	1.9111	4 40 55.2	9.227
5	23 18 53.26	1.9113	4 31 40.9	9.251
6	23 20 47.95	1.9116	4 22 25.1	9.275
7	23 22 42.65	1.9118	4 13 7.9	9.297
8	23 24 37.37	1.9122	4 3 49.4	9.319
9	23 26 32.12	1.9127	3 54 29.6	9.341
10	23 28 26.89	1.9131	3 45 8.5	9.362
11	23 30 21.69	1.9135	3 35 46.1	9.383
12	23 32 16.51	1.9140	3 26 22.5	9.403
13	23 34 11.37	1.9146	3 16 57.7	9.423
14	23 36 6.26	1.9152	3 7 31.7	9.442
15	23 38 1.19	1.9159	2 58 4.6	9.461
16	23 39 56.16	1.9166	2 48 36.4	9.478
17	23 41 51.18	1.9173	2 39 7.2	9.496
18	23 43 46.24	1.9181	2 29 36.9	9.513
19	23 45 41.35	1.9190	2 20 5.6	9.529
20	23 47 36.52	1.9199	2 10 33.4	9.545
21	23 49 31.74	1.9208	2 1 0.2	9.561
22	23 51 27.02	1.9218	1 51 26.1	9.575
23	23 53 22.36	1.9229	1 41 51.2	9.589
24	23 55 17.77	1.9240	S. 1 32 15.4	9.603

MONDAY 11.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
	h m s	s	° ′ ″	″
0	23 55 17.77	1.9240	S. 1 32 15.4	9.603
1	23 57 13.24	1.9252	1 22 38.8	9.616
2	23 59 8.79	1.9264	1 13 1.5	9.629
3	0 1 4.41	1.9276	1 3 23.4	9.641
4	0 3 0.10	1.9288	0 53 44.6	9.652
5	0 4 55.87	1.9302	0 44 5.1	9.663
6	0 6 51.73	1.9317	0 34 25.0	9.673
7	0 8 47.67	1.9331	0 24 44.3	9.683
8	0 10 43.70	1.9346	0 15 3.0	9.692
9	0 12 39.82	1.9362	S. 0 5 21.2	9.701
10	0 14 36.04	1.9377	N. 0 4 21.1	9.708
11	0 16 32.35	1.9393	0 14 3.8	9.716
12	0 18 28.76	1.9411	0 23 47.0	9.723
13	0 20 25.28	1.9429	0 33 30.6	9.729
14	0 22 21.91	1.9447	0 43 14.5	9.734
15	0 24 18.64	1.9465	0 52 58.7	9.739
16	0 26 15.49	1.9485	1 2 43.2	9.744
17	0 28 12.46	1.9505	1 12 28.0	9.748
18	0 30 9.55	1.9525	1 22 13.0	9.751
19	0 32 6.76	1.9546	1 31 58.1	9.754
20	0 34 4.10	1.9567	1 41 43.4	9.756
21	0 36 1.57	1.9589	1 51 28.8	9.757
22	0 37 59.17	1.9611	2 1 14.2	9.757
23	0 39 56.90	1.9633	N. 2 10 59.6	9.757

TUESDAY 12.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
0	0 41 54.77	1.9657	N. 2 20 45.1	9.757
1	0 43 52.79	1.9682	2 30 30.5	9.756
2	0 45 50.95	1.9706	2 40 15.8	9.754
3	0 47 49.26	1.9732	2 50 1.0	9.752
4	0 49 47.73	1.9757	2 59 46.0	9.748
5	0 51 46.35	1.9783	3 9 30.8	9.744
6	0 53 45.13	1.9810	3 19 15.3	9.739
7	0 55 44.07	1.9838	3 28 59.5	9.734
8	0 57 43.18	1.9866	3 38 43.4	9.729
9	0 59 42.46	1.9894	3 48 27.0	9.722
10	1 1 41.91	1.9922	3 58 10.1	9.715
11	1 3 41.53	1.9952	4 7 52.8	9.707
12	1 5 41.33	1.9982	4 17 35.0	9.698
13	1 7 41.31	2.0012	4 27 16.6	9.689
14	1 9 41.48	2.0044	4 36 57.7	9.680
15	1 11 41.84	2.0076	4 46 38.2	9.669
16	1 13 42.39	2.0108	4 56 18.0	9.657
17	1 15 43.14	2.0141	5 5 57.0	9.644
18	1 17 44.08	2.0173	5 15 35.3	9.631
19	1 19 45.22	2.0207	5 25 12.8	9.617
20	1 21 46.57	2.0242	5 34 49.4	9.603
21	1 23 48.13	2.0277	5 44 25.2	9.588
22	1 25 49.89	2.0312	5 54 0.0	9.573
23	1 27 51.87	2.0348	6 3 33.9	9.557
24	1 29 54.07	2.0385	N. 6 13 6.8	9.539

GREENWICH MEAN TIME.

THE MOON'S RIGHT ASCENSION AND DECLINATION.

SUNDAY 17.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
	h m s	s	° ′ ″	″
0	5 8 26.37	2.5377	N.17 46 40.0	3.253
1	5 10 58.78	2.5425	17 49 51.7	3.135
2	5 13 31.47	2.5471	17 52 56.2	3.015
3	5 16 4.43	2.5517	17 55 53.5	2.895
4	5 18 37.67	2.5562	17 58 43.6	2.773
5	5 21 11.17	2.5605	18 1 26.3	2.650
6	5 23 44.93	2.5648	18 4 1.6	2.527
7	5 26 18.95	2.5691	18 6 29.5	2.403
8	5 28 53.23	2.5734	18 8 50.0	2.279
9	5 31 27.76	2.5775	18 11 3.0	2.154
10	5 34 2.53	2.5815	18 13 8.5	2.027
11	5 36 37.54	2.5854	18 15 6.3	1.899
12	5 39 12.78	2.5893	18 16 56.4	1.771
13	5 41 48.25	2.5931	18 18 38.8	1.642
14	5 44 23.95	2.5967	18 20 13.5	1.513
15	5 46 59.86	2.6002	18 21 40.4	1.383
16	5 49 35.98	2.6037	18 22 59.5	1.252
17	5 52 12.31	2.6071	18 24 10.7	1.121
18	5 54 48.83	2.6104	18 25 14.0	0.989
19	5 57 25.55	2.6136	18 26 9.3	0.856
20	6 0 2.46	2.6166	18 26 56.7	0.723
21	6 2 39.54	2.6195	18 27 36.1	0.589
22	6 5 16.80	2.6224	18 28 7.4	0.455
23	6 7 54.23	2.6252	N.18 28 30.7	0.321

MONDAY 18.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
0	6 10 31.83	2.6279	N.18 28 45.9	0.185
1	6 13 9.58	2.6304	18 28 52.9	+ 0.049
2	6 15 47.48	2.6329	18 28 51.8	− 0.086
3	6 18 25.53	2.6352	18 28 42.6	0.222
4	6 21 3.71	2.6374	18 28 25.2	0.359
5	6 23 42.02	2.6395	18 27 59.5	0.496
6	6 26 20.45	2.6415	18 27 25.6	0.633
7	6 28 59.00	2.6434	18 26 43.5	0.771
8	6 31 37.66	2.6452	18 25 53.1	0.909
9	6 34 16.42	2.6468	18 24 54.4	1.047
10	6 36 55.28	2.6483	18 23 47.5	1.184
11	6 39 34.22	2.6497	18 22 32.3	1.322
12	6 42 13.24	2.6510	18 21 8.8	1.461
13	6 44 52.34	2.6522	18 19 37.0	1.599
14	6 47 31.50	2.6532	18 17 56.9	1.737
15	6 50 10.72	2.6542	18 16 8.5	1.876
16	6 52 50.00	2.6551	18 14 11.8	2.014
17	6 55 29.33	2.6558	18 12 6.8	2.152
18	6 58 8.70	2.6564	18 9 53.6	2.289
19	7 0 48.10	2.6568	18 7 32.1	2.427
20	7 3 27.52	2.6572	18 5 2.3	2.565
21	7 6 6.96	2.6574	18 2 24.3	2.702
22	7 8 46.41	2.6576	17 59 38.0	2.840
23	7 11 25.87	2.6576	17 56 43.5	2.977
24	7 14 5.32	2.6574	N.17 53 40.8	3.113

TUESDAY 19.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
	h m s	s	° ′ ″	″
0	7 14 5.32	2.6574	N.17 53 40.8	3.113
1	7 16 44.76	2.6572	17 50 29.9	3.249
2	7 19 24.19	2.6569	17 47 10.9	3.385
3	7 22 3.59	2.6564	17 43 43.7	3.521
4	7 24 42.96	2.6558	17 40 8.4	3.656
5	7 27 22.29	2.6552	17 36 25.0	3.791
6	7 30 1.58	2.6544	17 32 33.5	3.925
7	7 32 40.82	2.6535	17 28 34.0	4.058
8	7 35 20.00	2.6524	17 24 26.5	4.191
9	7 37 59.11	2.6512	17 20 11.1	4.323
10	7 40 38.15	2.6500	17 15 47.8	4.454
11	7 43 17.11	2.6487	17 11 16.6	4.586
12	7 45 55.99	2.6472	17 6 37.5	4.717
13	7 48 34.78	2.6457	17 1 50.6	4.846
14	7 51 13.47	2.6440	16 56 56.0	4.974
15	7 53 52.06	2.6422	16 51 53.7	5.102
16	7 56 30.54	2.6404	16 46 43.8	5.229
17	7 59 8.91	2.6384	16 41 26.2	5.356
18	8 1 47.15	2.6363	16 36 1.1	5.481
19	8 4 25.26	2.6341	16 30 28.5	5.606
20	8 7 3.24	2.6319	16 24 48.4	5.730
21	8 9 41.09	2.6297	16 19 0.9	5.852
22	8 12 18.80	2.6273	16 13 6.1	5.973
23	8 14 56.36	2.6247	N.16 7 4.1	6.093

WEDNESDAY 20.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
0	8 17 33.76	2.6220	N.16 0 54.9	6.213
1	8 20 11.00	2.6193	15 54 38.5	6.332
2	8 22 48.08	2.6165	15 48 15.0	6.450
3	8 25 24.98	2.6135	15 41 44.5	6.566
4	8 28 1.70	2.6106	15 35 7.1	6.681
5	8 30 38.25	2.6076	15 28 22.8	6.795
6	8 33 14.62	2.6046	15 21 31.7	6.908
7	8 35 50.80	2.6013	15 14 33.8	7.020
8	8 38 26.78	2.5980	15 7 29.3	7.130
9	8 41 2.56	2.5947	15 0 18.2	7.240
10	8 43 38.14	2.5913	14 53 0.5	7.348
11	8 46 13.51	2.5878	14 45 36.4	7.454
12	8 48 48.68	2.5843	14 38 6.0	7.559
13	8 51 23.63	2.5807	14 30 29.3	7.663
14	8 53 58.36	2.5770	14 22 46.4	7.767
15	8 56 32.87	2.5732	14 14 57.3	7.868
16	8 59 7.15	2.5694	14 7 2.2	7.968
17	9 1 41.20	2.5656	13 59 1.1	8.067
18	9 4 15.03	2.5618	13 50 54.2	8.163
19	9 6 48.62	2.5578	13 42 41.5	8.259
20	9 9 21.97	2.5538	13 34 23.1	8.354
21	9 11 55.08	2.5498	13 25 59.0	8.447
22	9 14 27.95	2.5458	13 17 29.4	8.539
23	9 17 0.57	2.5417	13 8 54.3	8.629
24	9 19 32.95	2.5375	N.13 0 13.9	8.718

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Name and Direction of Object.		Midnight.	P. L. of Diff.	XVh.	P. L. of Diff.	XVIIIh.	P. L. of Diff.	XXIh.	P. L. of Diff.
			° ′ ″		° ′ ″		° ′ ″		° ′ ″	
1	Regulus	W.	96 18 57	2901	97 51 15	2909	99 23 23	2916	100 55 21	2923
	Spica	W.	42 54 4	2930	44 25 45	2936	45 57 18	2942	47 28 44	2947
	Sun	E.	37 13 17	3313	35 49 21	3325	34 25 38	3335	33 2 7	3346
2	Regulus	W.	108 33 4	2955	110 4 13	2961	111 35 14	2967	113 6 8	2973
	Spica	W.	55 4 10	2974	56 34 55	2960	58 5 33	2965	59 36 5	2969
	Sun	E.	26 7 52	3408	24 45 45	3422	23 23 54	3436	22 2 21	3456
6	Sun	W.	18 32 36	3594	19 51 15	3579	21 10 14	3567	22 29 24	3558
	α Pegasi	E.	48 31 57	3575	47 12 55	3600	45 54 21	3629	44 36 18	3660
	α Arietis	E.	90 33 9	3199	89 6 59	3900	87 40 50	3902	86 14 43	3903
7	Sun	W.	29 7 25	3525	30 27 21	3521	31 47 22	3516	33 7 28	3511
	α Pegasi	E.	38 15 21	3865	37 1 26	3921	35 48 28	3964	34 36 33	4055
	α Arietis	E.	79 4 30	3909	77 38 32	3910	76 12 35	3911	74 46 39	3912
8	Sun	W.	39 49 14	3490	41 9 49	3485	42 30 30	3480	43 51 16	3475
	α Arietis	E.	67 37 15	3216	66 11 25	3217	64 45 36	3215	63 19 48	3220
	Aldebaran	E.	99 48 50	3066	98 19 59	3064	96 51 5	3061	95 22 8	3058
9	Sun	W.	50 36 38	3446	51 58 2	3439	53 19 34	3432	54 41 14	3425
	α Arietis	E.	56 11 8	3925	54 45 28	3927	53 19 51	3929	51 54 16	3931
	Aldebaran	E.	87 56 12	3036	86 26 44	3030	84 57 9	3025	83 27 27	3019
10	Sun	W.	61 31 47	3383	62 54 23	3373	64 17 10	3364	65 40 8	3358
	α Arietis	E.	44 47 18	3953	43 22 12	3960	41 57 14	3969	40 32 26	3980
	Aldebaran	E.	75 56 56	2983	74 26 22	2975	72 55 38	2966	71 24 43	2957
11	Sun	W.	72 38 11	3394	74 2 29	3382	75 27 1	3369	76 51 49	3355
	Venus	W.	31 32 53	3101	33 1 1	3088	34 29 25	3075	35 58 5	3060
	α Arietis	E.	33 32 22	3370	32 9 31	3400	30 47 14	3436	29 25 38	3480
	Aldebaran	E.	63 47 2	2905	62 14 50	2894	60 42 23	2882	59 9 41	2869
	Saturn	E.	89 10 17	2890	87 37 45	2878	86 4 58	2866	84 31 56	2854
12	Sun	W.	84 0 1	3180	85 26 34	3165	86 53 25	3148	88 20 36	3132
	Fomalhaut	W.	47 9 12	3469	48 30 11	3423	49 52 2	3379	51 14 42	3338
	Venus	W.	43 25 58	2985	44 56 30	2968	46 27 23	2951	47 58 37	2934
	Aldebaran	E.	51 22 1	2802	49 47 36	2788	48 12 52	2772	46 37 48	2756
	Saturn	E.	76 42 40	2788	75 7 57	2774	73 32 55	2759	71 57 33	2744
13	Sun	W.	95 41 44	3043	97 11 4	3024	98 40 47	3005	100 10 53	2986
	Fomalhaut	W.	58 19 30	3154	59 46 34	3121	61 14 18	3089	62 42 41	3059
	Venus	W.	55 40 21	2844	57 13 52	2825	58 47 48	2805	60 22 9	2786
	α Pegasi	W.	43 27 12	3255	44 52 16	3204	46 18 19	3159	47 45 17	3115
	Aldebaran	E.	38 37 16	2676	37 0 4	2659	35 22 29	2641	33 44 30	2624
	Saturn	E.	63 55 39	2665	62 18 12	2649	60 40 23	2632	59 2 11	2615
	Pollux	E.	82 36 25	2756	81 1 0	2741	79 25 14	2724	77 49 6	2707
14	Sun	W.	107 47 29	2887	109 20 4	2867	110 53 5	2847	112 26 32	2827
	Fomalhaut	W.	70 13 42	2917	71 45 39	2891	73 18 9	2866	74 51 12	2840
	Venus	W.	68 20 23	2685	69 57 23	2665	71 34 50	2644	73 12 45	2624
	α Pegasi	W.	55 12 41	2924	56 44 29	2891	58 16 59	2859	59 50 11	2828

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Name and Direction of Object.		Noon.	P. L. of Diff.	IIIh.	P. L. of Diff.	VIh.	P. L. of Diff.	IXh	P. L. of Diff.
22	JUPITER	E.	32° 46′ 44″	2050	30° 54′ 28″	2062	29° 2′ 31″	2075	27° 10′ 54″	2088
	Spica	E.	48 55 27	2083	47 4 1	2096	45 12 56	2111	43 22 14	2126
	Antares	E.	94 44 26	2114	92 53 48	2126	91 3 29	2139	89 13 30	2153
23	SATURN	W.	75 17 4	2059	77 6 34	2075	78 55 39	2091	80 44 20	2108
	Pollux	W.	56 39 11	2278	58 25 43	2290	60 11 57	2302	61 57 53	2316
	Spica	E.	34 15 18	2222	32 27 23	2243	30 40 0	2267	28 53 12	2292
	Antares	E.	80 9 0	2230	78 21 17	2247	76 34 0	2265	74 47 9	2283
	SUN	E.	135 24 44	2497	133 43 27	2514	132 2 33	2530	130 22 2	2548
24	SATURN	W.	89 41 23	2296	91 27 29	2313	93 13 9	2332	94 58 22	2350
	Pollux	W.	70 42 20	2391	72 26 7	2408	74 9 30	2425	75 52 29	2442
	Regulus	W.	34 8 21	2313	35 54 2	2330	37 39 18	2348	39 24 8	2365
	Antares	E.	65 59 40	2379	64 15 35	2400	62 32 0	2420	60 48 54	2441
	SUN	E.	122 5 36	2640	120 27 35	2658	118 49 59	2678	117 12 49	2698
25	Pollux	W.	84 21 18	2530	86 1 49	2548	87 41 55	2566	89 21 37	2584
	Regulus	W.	48 1 55	2455	49 44 11	2473	51 26 2	2491	53 7 28	2510
	MARS	W.	21 1 25	2489	22 42 53	2502	24 24 3	2516	26 4 54	2530
	Antares	E.	52 21 3	2553	50 41 3	2576	49 1 35	2599	47 22 39	2624
	SUN	E.	109 13 29	2795	107 38 54	2815	106 4 45	2834	104 31 1	2853
26	Regulus	W.	61 28 25	2596	63 7 25	2614	64 46 1	2631	66 24 14	2647
	MARS	W.	34 23 59	2607	36 2 45	2622	37 41 10	2638	39 19 14	2652
	JUPITER	W.	23 49 41	2587	25 28 54	2604	27 7 44	2620	28 46 12	2637
	Antares	E.	39 16 36	2758	37 41 13	2787	36 6 28	2818	34 32 24	2852
	SUN	E.	96 48 31	2948	95 17 13	2966	93 46 18	2985	92 15 46	3003
27	Regulus	W.	74 29 55	2725	76 6 1	2741	77 41 47	2755	79 17 14	2769
	MARS	W.	47 24 33	2725	49 0 39	2740	50 36 26	2753	52 11 55	2766
	JUPITER	W.	36 53 3	2715	38 29 23	2730	40 5 23	2744	41 41 5	2758
	Spica	W.	21 25 46	2843	22 59 18	2842	24 32 51	2845	26 6 21	2849
	SUN	E.	84 48 31	3087	83 20 6	3104	81 52 1	3119	80 24 15	3135
28	Regulus	W.	87 9 58	2835	88 43 40	2848	90 17 6	2860	91 50 16	2871
	MARS	W.	60 5 7	2828	61 38 58	2840	63 12 34	2852	64 45 55	2862
	JUPITER	W.	49 35 3	2824	51 9 0	2835	52 42 42	2848	54 16 8	2859
	Spica	W.	33 51 58	2885	35 24 36	2894	36 57 3	2901	38 29 20	2910
	SUN	E.	73 9 57	3207	71 43 56	3220	70 18 11	3233	68 52 41	3247
29	MARS	W.	72 29 22	2911	74 1 27	2920	75 33 21	2928	77 5 4	2936
	JUPITER	W.	61 59 50	2910	63 31 56	2920	65 3 50	2928	66 35 33	2937
	Spica	W.	46 8 3	2952	47 39 16	2960	49 10 19	2968	50 41 12	2975
	SUN	E.	61 48 47	3303	60 24 39	3313	59 0 43	3324	57 36 59	3338
30	JUPITER	W.	74 11 34	2974	75 42 19	2981	77 12 55	2987	78 43 24	2993
	Spica	W.	58 13 24	3009	59 43 25	3015	61 13 19	3021	62 43 6	3026
	SUN	E.	50 40 58	3377	49 18 15	3384	47 55 40	3392	46 33 14	3398
31	Spica	W.	70 10 25	3050	71 39 36	3054	73 8 42	3058	74 37 43	3062
	Antares	W.	25 46 58	3365	27 9 54	3337	28 33 23	3313	29 57 19	3294
	SUN	E.	39 42 55	3430	38 21 2	3435	36 59 35	3440	35 38 4	3445

AT GREENWICH APPARENT NOON.

Day of the Week.	Day of the Month.	THE SUN'S Apparent Right Ascension.	Diff. for 1 Hour.	Apparent Declination.	Diff. for 1 Hour.	Semi-diameter.	Sidereal Time of Semi-diameter Passing Meridian.	Equation of Time, to be Added to Apparent Time.	Diff 1 H
		h m s	s	° ′ ″	″	′ ″	s	m s	s
Mon.	1	21 0 20.85	10.183	S. 17 1 43.8	+42.89	16 15.94	68.24	13 50.68	0.
Tues.	2	21 4 24.82	10.149	16 44 25.4	43.63	16 15.79	68.13	13 58.09	0.
Wed.	3	21 8 27.98	10.114	16 26 49.4	44.36	16 15.63	68.01	14 4.68	0.
Thur.	4	21 12 30.33	10.080	16 8 56.4	+45.06	16 15.47	67.90	14 10.45	0.
Frid.	5	21 16 31.86	10.046	15 50 46.7	45.74	16 15.31	67.78	14 15.41	0.
Sat.	6	21 20 32.57	10.012	15 32 20.8	46.41	16 15.15	67.67	14 19.55	0.
SUN.	7	21 24 32.46	9.978	15 13 39.1	+47.06	16 14.98	67.55	14 22.87	0.
Mon.	8	21 28 31.53	9.944	14 54 42.0	47.69	16 14.81	67.44	14 25.38	0.
Tues.	9	21 32 29.79	9.911	14 35 29.9	48.31	16 14.63	67.33	14 27.08	0.
Wed.	10	21 36 27.24	9.878	14 16 3.2	+48.90	16 14.45	67.22	14 27.98	0.
Thur.	11	21 40 23.89	9.845	13 56 22.5	49.48	16 14.27	67.11	14 28.09	0.
Frid.	12	21 44 19.76	9.812	13 36 28.2	50.05	16 14.09	67.00	14 27.41	0.
Sat.	13	21 48 14.85	9.780	13 16 20.5	+50.60	16 13.90	66.89	14 25.95	0.
SUN.	14	21 52 9.18	9.748	12 55 59.9	51.12	16 13.71	66.78	14 23.73	0.
Mon.	15	21 56 2.75	9.717	12 35 26.8	51.63	16 13.51	66.68	14 20.76	0.
Tues.	16	21 59 55.59	9.687	12 14 41.7	+52.12	16 13.31	66.57	14 17.04	0.
Wed.	17	22 3 47.70	9.657	11 53 45.0	52.59	16 13.10	66.47	14 12.61	0.
Thur.	18	22 7 39.11	9.628	11 32 37.1	53.05	16 12.89	66.37	14 7.48	0.
Frid.	19	22 11 29.82	9.599	11 11 18.3	+53.50	16 12.67	66.28	14 1.66	0.
Sat.	20	22 15 19.87	9.572	10 49 48.9	53.92	16 12.45	66.18	13 55.17	0.
SUN.	21	22 19 9.28	9.545	10 28 9.5	54.33	16 12.23	66.09	13 48.04	0.
Mon.	22	22 22 58.05	9.519	10 6 20.5	+54.73	16 12.00	66.00	13 40.29	0.
Tues.	23	22 26 46.20	9.494	9 44 22.2	55.12	16 11.77	65.91	13 31.92	0.
Wed.	24	22 30 33.76	9.470	9 22 15.0	55.48	16 11.54	65.82	13 22.95	0.
Thur.	25	22 34 20.74	9.446	8 59 59.3	+55.83	16 11.30	65.73	13 13.40	0.
Frid.	26	22 38 7.17	9.423	8 37 35.6	56.15	16 11.06	65.65	13 3.31	0.
Sat.	27	22 41 53.06	9.401	8 15 4.2	56.46	16 10.81	65.56	12 52.68	0.
SUN.	28	22 45 38.43	9.380	7 52 25.4	56.76	16 10.57	65.48	12 41.52	0.
Mon.	29	22 49 23.29	9.359	S. 7 29 39.7	+57.03	16 10.32	65.41	12 29.85	0.

NOTE.—The mean time of semidiameter passing may be found by subtracting 0ˢ.18 from the sidereal time.
The sign + prefixed to the hourly change of declination indicates that south declinations are decreasi

GREENWICH MEAN TIME.

THE MOON'S

Day of the Month.	Semidiameter. Noon.	Semidiameter. Midnight.	Horizontal Parallax. Noon.	Diff. for 1 Hour.	Horizontal Parallax. Midnight.	Diff. for 1 Hour.	Upper Transit. Meridian of Greenwich.	Diff. for 1 Hour.	Age. Noon.
	′ ″	′ ″	′ ″	″	′ ″	″	h m	m	d
1	14 46.2	14 44.9	54 5.4	−0.45	54 0.7	−0.33	22 56.3	1.93	27.2
2	14 44.0	14 43.6	53 57.5	−0.20	53 55.8	−0.09	23 42.4	1.89	28.2
3	14 43.4	14 43.7	53 55.3	+0.02	53 56.2	+0.13	6		29.2
4	14 44.3	14 45.2	53 58.3	+0.23	54 1.7	+0.33	0 27.6	1.85	0.4
5	14 46.5	14 48.1	54 6.4	0.44	54 12.3	0.55	1 11.8	1.82	1.4
6	14 50.1	14 52.4	54 19.6	0.66	54 28.2	0.78	1 55.3	1.80	2.4
7	14 55.1	14 58.3	54 38.3	+0.90	54 49.9	+1.03	2 38.6	1.81	3.4
8	15 1.9	15 6.0	55 3.2	1.17	55 18.0	1.31	3 22.2	1.83	4.4
9	15 10.4	15 15.4	55 34.5	1.45	55 52.8	1.59	4 6.9	1.89	5.4
10	15 20.8	15 26.7	56 12.6	+1.73	56 34.2	+1.86	4 53.2	1.98	6.4
11	15 33.0	15 39.6	56 57.2	1.98	57 21.6	2.08	5 42.0	2.09	7.4
12	15 46.5	15 53.7	57 47.0	2.15	58 13.2	2.20	6 33.8	2.23	8.4
13	16 0.9	16 8.1	58 39.8	+2.21	59 6.3	+2.18	7 28.9	2.36	9.4
14	16 15.1	16 21.8	59 32.0	2.10	59 56.5	1.96	8 26.9	2.47	10.4
15	16 27.9	16 33.3	60 19.1	1.77	60 38.9	1.52	9 27.0	2.53	11.4
16	16 37.8	16 41.3	60 55.5	+1.22	61 8.1	+0.67	10 27.8	2.53	12.4
17	16 43.5	16 44.4	61 16.2	+0.48	61 19.6	+0.07	11 27.9	2.47	13.4
18	16 44.0	16 42.2	61 18.0	−0.35	61 11.4	−0.75	12 26.3	2.39	14.4
19	16 39.1	16 34.7	60 59.9	−1.14	60 44.0	−1.49	13 22.5	2.29	15.4
20	16 29.3	16 23.0	60 24.1	1.80	60 0.8	2.04	14 16.6	2.21	16.4
21	16 15.9	16 8.4	59 35.0	2.24	59 7.3	2.36	15 8.9	2.15	17.4
22	16 0.5	15 52.5	58 38.4	−2.43	58 9.0	−2.44	15 59.9	2.10	18.4
23	15 44.5	15 36.8	57 39.8	2.41	57 11.2	2.33	16 50.1	2.08	19.4
24	15 29.3	15 22.3	56 43.8	2.22	56 18.0	2.08	17 39.7	2.06	20.4
25	15 15.8	15 9.8	55 54.1	−1.91	55 32.2	−1.73	18 28.9	2.04	21.4
26	15 4.5	14 59.8	55 12.6	1.54	54 55.3	1.34	19 17.6	2.02	22.4
27	14 55.7	14 52.3	54 40.5	1.14	54 28.0	0.94	20 5.7	1.99	23.4
28	14 49.6	14 47.4	54 17.9	0.75	54 10.0	0.56	20 53.0	1.95	24.4
29	14 45.9	14 44.9	54 4.4	−0.39	54 0.8	−0.22	21 39.4	1.91	25.4

GREENWICH MEAN TIME.

THE MOON'S RIGHT ASCENSION AND DECLINATION.

MONDAY 1.

Hour.	Right Ascension. h	m	s	Diff. for 1 Minute. s	Declination. °	′	″	Diff. for 1 Minute. ″
0	18	59	9.09	2.0777	S.18	7	22.8	1.792
1	19	1	13.72	2.0766	18	5	32.8	1.875
2	19	3	18.28	2.0755	18	3	37.8	1.958
3	19	5	22.78	2.0744	18	1	37.8	2.041
4	19	7	27.21	2.0732	17	59	32.9	2.123
5	19	9	31.56	2.0719	17	57	23.1	2.204
6	19	11	35.84	2.0707	17	55	8.4	2.285
7	19	13	40.05	2.0695	17	52	48.8	2.367
8	19	15	44.18	2.0682	17	50	24.3	2.449
9	19	17	48.23	2.0669	17	47	54.9	2.530
10	19	19	52.21	2.0656	17	45	20.7	2.610
11	19	21	56.11	2.0643	17	42	41.7	2.690
12	19	23	59.93	2.0630	17	39	57.9	2.770
13	19	26	3.67	2.0617	17	37	9.3	2.850
14	19	28	7.33	2.0603	17	34	15.9	2.930
15	19	30	10.91	2.0590	17	31	17.7	3.009
16	19	32	14.41	2.0576	17	28	14.8	3.088
17	19	34	17.82	2.0562	17	25	7.2	3.167
18	19	36	21.15	2.0547	17	21	54.8	3.245
19	19	38	24.39	2.0533	17	18	37.8	3.322
20	19	40	27.55	2.0519	17	15	16.1	3.400
21	19	42	30.62	2.0504	17	11	49.8	3.477
22	19	44	33.60	2.0489	17	8	18.8	3.555
23	19	46	36.49	2.0475	S.17	4	43.2	3.632

TUESDAY 2.

Hour.	Right Ascension. h	m	s	Diff. for 1 Minute. s	Declination. °	′	″	Diff. for 1 Minute. ″
0	19	48	39.30	2.0461	S.17	1	3.0	3.708
1	19	50	42.02	2.0446	16	57	18.2	3.784
2	19	52	44.65	2.0430	16	53	28.9	3.859
3	19	54	47.18	2.0414	16	49	35.1	3.934
4	19	56	49.62	2.0399	16	45	36.8	4.009
5	19	58	51.97	2.0384	16	41	34.0	4.084
6	20	0	54.23	2.0368	16	37	26.7	4.158
7	20	2	56.39	2.0353	16	33	15.0	4.232
8	20	4	58.46	2.0338	16	28	58.9	4.305
9	20	7	0.44	2.0322	16	24	38.4	4.378
10	20	9	2.32	2.0305	16	20	13.5	4.451
11	20	11	4.10	2.0289	16	15	44.2	4.524
12	20	13	5.79	2.0273	16	11	10.6	4.596
13	20	15	7.38	2.0258	16	6	32.7	4.667
14	20	17	8.88	2.0242	16	1	50.6	4.738
15	20	19	10.28	2.0225	15	57	4.2	4.809
16	20	21	11.58	2.0208	15	52	13.5	4.879
17	20	23	12.78	2.0192	15	47	18.7	4.948
18	20	25	13.89	2.0177	15	42	19.7	5.017
19	20	27	14.90	2.0160	15	37	16.6	5.087
20	20	29	15.81	2.0143	15	32	9.3	5.156
21	20	31	16.62	2.0127	15	26	57.9	5.224
22	20	33	17.33	2.0110	15	21	42.4	5.291
23	20	35	17.94	2.0094	15	16	22.9	5.358
24	20	37	18.46	2.0078	S.15	10	59.4	5.425

WEDNESDAY 3.

Hour.	Right Ascension. h	m	s	Diff. for 1 Minute. s	Declination. °	′	″	Diff. for 1 Minute. ″
0	20	37	18.46	2.0078	S.15	10	59.4	5.425
1	20	39	18.88	2.0061	15	5	31.9	5.492
2	20	41	19.20	2.0044	15	0	0.4	5.558
3	20	43	19.41	2.0028	14	54	24.9	5.624
4	20	45	19.53	2.0012	14	48	45.5	5.688
5	20	47	19.55	1.9995	14	43	2.3	5.752
6	20	49	19.47	1.9978	14	37	15.2	5.816
7	20	51	19.29	1.9962	14	31	24.3	5.881
8	20	53	19.02	1.9946	14	25	29.6	5.944
9	20	55	18.65	1.9930	14	19	31.0	6.007
10	20	57	18.18	1.9913	14	13	28.7	6.069
11	20	59	17.61	1.9897	14	7	22.7	6.131
12	21	1	16.94	1.9881	14	1	13.0	6.192
13	21	3	16.18	1.9865	13	54	59.7	6.252
14	21	5	15.32	1.9848	13	48	42.7	6.313
15	21	7	14.36	1.9832	13	42	22.1	6.373
16	21	9	13.31	1.9816	13	35	57.9	6.432
17	21	11	12.16	1.9800	13	29	30.2	6.491
18	21	13	10.91	1.9784	13	22	59.0	6.548
19	21	15	9.57	1.9769	13	16	24.3	6.607
20	21	17	8.14	1.9753	13	9	46.1	6.665
21	21	19	6.61	1.9737	13	3	4.5	6.722
22	21	21	4.99	1.9722	12	56	19.5	6.778
23	21	23	3.28	1.9707	S.12	49	31.1	6.834

THURSDAY 4.

Hour.	Right Ascension. h	m	s	Diff. for 1 Minute. s	Declination. °	′	″	Diff. for 1 Minute. ″
0	21	25	1.48	1.9692	S.12	42	39.4	6.889
1	21	26	59.59	1.9677	12	35	44.4	6.944
2	21	28	57.60	1.9661	12	28	46.1	6.999
3	21	30	55.52	1.9646	12	21	44.5	7.053
4	21	32	53.35	1.9632	12	14	39.7	7.106
5	21	34	51.10	1.9617	12	7	31.8	7.158
6	21	36	48.76	1.9602	12	0	20.7	7.211
7	21	38	46.33	1.9588	11	53	6.5	7.263
8	21	40	43.82	1.9574	11	45	49.2	7.314
9	21	42	41.22	1.9560	11	38	28.8	7.365
10	21	44	38.54	1.9546	11	31	5.4	7.415
11	21	46	35.78	1.9532	11	23	39.0	7.464
12	21	48	32.93	1.9518	11	16	9.7	7.513
13	21	50	30.00	1.9505	11	8	37.4	7.562
14	21	52	26.99	1.9492	11	1	2.2	7.610
15	21	54	23.91	1.9480	10	53	24.2	7.657
16	21	56	20.75	1.9467	10	45	43.3	7.705
17	21	58	17.51	1.9454	10	37	59.6	7.752
18	22	0	14.19	1.9441	10	30	13.1	7.798
19	22	2	10.80	1.9429	10	22	23.9	7.843
20	22	4	7.34	1.9417	10	14	32.0	7.888
21	22	6	3.80	1.9404	10	6	37.4	7.932
22	22	8	0.19	1.9393	9	58	40.2	7.975
23	22	9	56.51	1.9382	9	50	40.4	8.019
24	22	11	52.77	1.9371	S. 9	42	37.9	8.062

GREENWICH MEAN TIME.

THE MOON'S RIGHT ASCENSION AND DECLINATION.

FRIDAY 5.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
	h m s	s	° ′ ″	″
0	22 11 52.77	1.9371	S. 9 42 37.9	8.062
1	22 13 48.96	1.9360	9 34 32.9	8.104
2	22 15 45.08	1.9348	9 26 25.4	8.145
3	22 17 41.14	1.9337	9 18 15.5	8.186
4	22 19 37.13	1.9327	9 10 3.1	8.227
5	22 21 33.07	1.9318	9 1 48.3	8.267
6	22 23 28.95	1.9308	8 53 31.1	8.307
7	22 25 24.77	1.9298	8 45 11.5	8.345
8	22 27 20.53	1.9289	8 36 49.7	8.383
9	22 29 16.24	1.9280	8 28 25.6	8.421
10	22 31 11.89	1.9271	8 19 59.2	8.458
11	22 33 7.49	1.9263	8 11 30.6	8.495
12	22 35 3.04	1.9254	8 2 59.8	8.531
13	22 36 58.54	1.9247	7 54 26.9	8.566
14	22 38 54.00	1.9239	7 45 51.9	8.602
15	22 40 49.41	1.9232	7 37 14.7	8.637
16	22 42 44.78	1.9224	7 28 35.5	8.670
17	22 44 40.10	1.9217	7 19 54.3	8.702
18	22 46 35.38	1.9211	7 11 11.2	8.735
19	22 48 30.63	1.9205	7 2 26.1	8.767
20	22 50 25.84	1.9198	6 53 39.1	8.799
21	22 52 21.01	1.9192	6 44 50.2	8.831
22	22 54 16.15	1.9187	6 35 59.4	8.862
23	22 56 11.26	1.9182	S. 6 27 6.8	8.891

SATURDAY 6.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
0	22 58 6.34	1.9178	S. 6 18 12.5	8.920
1	23 0 1.40	1.9174	6 9 16.4	8.949
2	23 1 56.43	1.9169	6 0 18.6	8.977
3	23 3 51.43	1.9165	5 51 19.1	9.005
4	23 5 46.41	1.9162	5 42 18.0	9.032
5	23 7 41.38	1.9160	5 33 15.3	9.058
6	23 9 36.33	1.9157	5 24 11.0	9.084
7	23 11 31.26	1.9154	5 15 5.2	9.109
8	23 13 26.18	1.9152	5 5 57.9	9.134
9	23 15 21.09	1.9151	4 56 49.1	9.159
10	23 17 15.99	1.9149	4 47 38.8	9.182
11	23 19 10.88	1.9148	4 38 27.2	9.205
12	23 21 5.76	1.9147	4 29 14.2	9.227
13	23 23 0.64	1.9147	4 19 59.9	9.249
14	23 24 55.52	1.9148	4 10 44.3	9.271
15	23 26 50.41	1.9148	4 1 27.4	9.292
16	23 28 45.30	1.9149	3 52 9.3	9.312
17	23 30 40.20	1.9150	3 42 50.0	9.332
18	23 32 35.10	1.9151	3 33 29.5	9.351
19	23 34 30.01	1.9153	3 24 7.9	9.369
20	23 36 24.94	1.9156	3 14 45.2	9.386
21	23 38 19.80	1.9159	3 5 21.5	9.403
22	23 40 14.85	1.9162	2 55 56.8	9.420
23	23 42 9.83	1.9165	2 46 31.1	9.437
24	23 44 4.83	1.9169	S. 2 37 4.4	9.452

SUNDAY 7.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
	h m s	s	° ′ ″	″
0	23 44 4.83	1.9169	S. 2 37 4.4	9.452
1	23 45 59.86	1.9174	2 27 36.8	9.467
2	23 47 54.92	1.9178	2 18 8.4	9.481
3	23 49 50.00	1.9183	2 8 39.1	9.495
4	23 51 45.11	1.9188	1 59 9.0	9.508
5	23 53 40.26	1.9195	1 49 38.2	9.520
6	23 55 35.45	1.9202	1 40 6.6	9.532
7	23 57 30.68	1.9208	1 30 34.3	9.543
8	23 59 25.95	1.9215	1 21 1.4	9.554
9	0 1 21.26	1.9223	1 11 27.8	9.565
10	0 3 16.62	1.9231	1 1 53.6	9.574
11	0 5 12.03	1.9239	0 52 18.9	9.583
12	0 7 7.49	1.9248	0 42 43.7	9.591
13	0 9 3.01	1.9257	0 33 8.0	9.598
14	0 10 58.58	1.9267	0 23 31.9	9.606
15	0 12 54.21	1.9277	0 13 55.3	9.612
16	0 14 49.90	1.9287	S. 0 4 18.4	9.618
17	0 16 45.66	1.9298	N. 0 5 18.9	9.624
18	0 18 41.48	1.9309	0 14 56.5	9.628
19	0 20 37.37	1.9322	0 24 34.3	9.632
20	0 22 33.34	1.9335	0 34 12.3	9.636
21	0 24 29.39	1.9348	0 43 50.6	9.639
22	0 26 25.52	1.9361	0 53 29.0	9.641
23	0 28 21.72	1.9374	N. 1 3 7.5	9.642

MONDAY 8.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
0	0 30 18.00	1.9388	N. 1 12 46.1	9.643
1	0 32 14.37	1.9402	1 22 24.7	9.643
2	0 34 10.83	1.9417	1 32 3.3	9.643
3	0 36 7.38	1.9433	1 41 41.9	9.642
4	0 38 4.03	1.9449	1 51 20.4	9.641
5	0 40 0.77	1.9465	2 0 58.8	9.639
6	0 41 57.61	1.9482	2 10 37.0	9.636
7	0 43 54.55	1.9499	2 20 15.1	9.632
8	0 45 51.60	1.9517	2 29 52.9	9.627
9	0 47 48.76	1.9536	2 39 30.4	9.622
10	0 49 46.03	1.9554	2 49 7.6	9.617
11	0 51 43.41	1.9573	2 58 44.4	9.611
12	0 53 40.90	1.9592	3 8 20.9	9.604
13	0 55 38.51	1.9612	3 17 56.9	9.597
14	0 57 36.25	1.9633	3 27 32.5	9.589
15	0 59 34.11	1.9653	3 37 7.6	9.581
16	1 1 32.09	1.9675	3 46 42.2	9.571
17	1 3 30.21	1.9697	3 56 16.1	9.560
18	1 5 28.46	1.9720	4 5 49.4	9.550
19	1 7 26.85	1.9742	4 15 22.1	9.538
20	1 9 25.37	1.9765	4 24 54.0	9.526
21	1 11 24.03	1.9789	4 34 25.2	9.513
22	1 13 22.84	1.9813	4 43 55.6	9.500
23	1 15 21.79	1.9838	4 53 25.2	9.486
24	1 17 20.89	1.9863	N. 5 2 53.9	9.471

GREENWICH MEAN TIME.

THE MOON'S RIGHT ASCENSION AND DECLINATION.

TUESDAY 9.

Hour.	Right Ascension. h m s	Diff. for 1 Minute. s	Declination. ° ′ ″	Diff. for 1 Minute. ″
0	1 17 20.89	1.9863	N. 5 2 53.9	9.471
1	1 19 20.15	1.9889	5 12 21.7	9.455
2	1 21 19.56	1.9915	5 21 48.5	9.439
3	1 23 19.13	1.9942	5 31 14.4	9.422
4	1 25 18.86	1.9968	5 40 39.2	9.404
5	1 27 18.75	1.9996	5 50 2.9	9.385
6	1 29 18.81	2.0024	5 59 25.4	9.366
7	1 31 19.04	2.0053	6 8 46.8	9.347
8	1 33 19.44	2.0082	6 18 7.0	9.326
9	1 35 20.02	2.0111	6 27 25.9	9.304
10	1 37 20.77	2.0141	6 36 43.5	9.282
11	1 39 21.71	2.0172	6 45 59.8	9.260
12	1 41 22.83	2.0202	6 55 14.7	9.237
13	1 43 24.13	2.0233	7 4 28.2	9.212
14	1 45 25.62	2.0265	7 13 40.2	9.187
15	1 47 27.31	2.0297	7 22 50.6	9.161
16	1 49 29.19	2.0330	7 31 59.5	9.135
17	1 51 31.27	2.0362	7 41 6.8	9.107
18	1 53 33.54	2.0395	7 50 12.4	9.079
19	1 55 36.01	2.0429	7 59 16.3	9.050
20	1 57 38.69	2.0464	8 8 18.4	9.020
21	1 59 41.58	2.0499	8 17 18.7	8.990
22	2 1 44.68	2.0534	8 26 17.2	8.959
23	2 3 47.99	2.0570	N. 8 35 13.8	8.927

WEDNESDAY 10.

Hour.	Right Ascension. h m s	Diff. for 1 Minute. s	Declination. ° ′ ″	Diff. for 1 Minute. ″
0	2 5 51.52	2.0606	N. 8 44 8.5	8.895
1	2 7 55.26	2.0642	8 53 1.2	8.861
2	2 9 59.22	2.0679	9 1 51.8	8.826
3	2 12 3.41	2.0717	9 10 40.3	8.791
4	2 14 7.83	2.0756	9 19 26.7	8.756
5	2 16 12.48	2.0794	9 28 11.0	8.719
6	2 18 17.36	2.0833	9 36 53.0	8.681
7	2 20 22.47	2.0872	9 45 32.7	8.642
8	2 22 27.82	2.0911	9 54 10.1	8.603
9	2 24 33.40	2.0951	10 2 45.1	8.563
10	2 26 39.23	2.0992	10 11 17.6	8.522
11	2 28 45.30	2.1032	10 19 47.7	8.481
12	2 30 51.61	2.1073	10 28 15.3	8.438
13	2 32 58.17	2.1115	10 36 40.3	8.394
14	2 35 4.99	2.1157	10 45 2.6	8.350
15	2 37 12.06	2.1200	10 53 22.3	8.305
16	2 39 19.39	2.1242	11 1 39.2	8.259
17	2 41 26.97	2.1285	11 9 53.3	8.212
18	2 43 34.81	2.1328	11 18 4.6	8.164
19	2 45 42.91	2.1372	11 26 13.0	8.115
20	2 47 51.28	2.1417	11 34 18.4	8.065
21	2 49 59.91	2.1461	11 42 20.8	8.015
22	2 52 8.81	2.1506	11 50 20.2	7.964
23	2 54 17.98	2.1552	11 58 16.5	7.912
24	2 56 27.43	2.1597	N.12 6 9.6	7.858

THURSDAY 11.

Hour.	Right Ascension. h m s	Diff. for 1 Minute. s	Declination. ° ′ ″	Diff. for 1 Minute. ″
0	2 56 27.43	2.1597	N.12 6 9.6	7.858
1	2 58 37.15	2.1643	12 13 59.5	7.804
2	3 0 47.15	2.1689	12 21 46.1	7.749
3	3 2 57.42	2.1735	12 29 29.4	7.693
4	3 5 7.97	2.1782	12 37 9.3	7.636
5	3 7 18.80	2.1829	12 44 45.7	7.577
6	3 9 29.92	2.1877	12 52 18.6	7.518
7	3 11 41.32	2.1924	12 59 47.9	7.459
8	3 13 53.01	2.1972	13 7 13.7	7.399
9	3 16 4.99	2.2020	13 14 35.8	7.337
10	3 18 17.25	2.2068	13 21 54.1	7.274
11	3 20 29.81	2.2117	13 29 8.7	7.211
12	3 22 42.66	2.2166	13 36 19.5	7.147
13	3 24 55.80	2.2215	13 43 26.4	7.082
14	3 27 9.24	2.2265	13 50 29.3	7.015
15	3 29 22.98	2.2315	13 57 28.2	6.947
16	3 31 37.02	2.2364	14 4 23.0	6.879
17	3 33 51.35	2.2413	14 11 13.7	6.810
18	3 36 5.98	2.2463	14 18 0.2	6.739
19	3 38 20.91	2.2513	14 24 42.4	6.668
20	3 40 36.14	2.2564	14 31 20.4	6.597
21	3 42 51.68	2.2615	14 37 54.0	6.523
22	3 45 7.52	2.2665	14 44 23.2	6.449
23	3 47 23.66	2.2716	N.14 50 47.9	6.374

FRIDAY 12.

Hour.	Right Ascension. h m s	Diff. for 1 Minute. s	Declination. ° ′ ″	Diff. for 1 Minute. ″
0	3 49 40.11	2.2767	N.14 57 8.1	6.298
1	3 51 56.86	2.2818	15 3 23.7	6.221
2	3 54 13.92	2.2869	15 9 34.6	6.142
3	3 56 31.29	2.2920	15 15 40.8	6.063
4	3 58 48.96	2.2971	15 21 42.2	5.983
5	4 1 6.94	2.3022	15 27 38.8	5.902
6	4 3 25.23	2.3074	15 33 30.5	5.820
7	4 5 43.83	2.3125	15 39 17.2	5.737
8	4 8 2.73	2.3176	15 44 58.9	5.653
9	4 10 21.94	2.3227	15 50 35.6	5.569
10	4 12 41.46	2.3278	15 56 7.2	5.483
11	4 15 1.28	2.3329	16 1 33.6	5.395
12	4 17 21.41	2.3381	16 6 54.6	5.306
13	4 19 41.85	2.3432	16 12 10.3	5.217
14	4 22 2.59	2.3483	16 17 20.7	5.128
15	4 24 23.64	2.3534	16 22 25.7	5.037
16	4 26 45.00	2.3585	16 27 25.2	4.946
17	4 29 6.66	2.3635	16 32 19.2	4.852
18	4 31 28.62	2.3686	16 37 7.5	4.758
19	4 33 50.89	2.3736	16 41 50.2	4.664
20	4 36 13.46	2.3786	16 46 27.2	4.568
21	4 38 36.32	2.3835	16 50 58.4	4.471
22	4 40 59.48	2.3885	16 55 23.7	4.372
23	4 43 22.94	2.3935	16 59 43.1	4.273
24	4 45 46.70	2.3984	N.17 3 56.5	4.173

GREENWICH MEAN TIME.

THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.	Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
	WEDNESDAY 17.					**FRIDAY 19.**			
	h m s	s	° ′ ″	″		h m s	s	° ′ ″	″
0	8 50 1.80	2.5682	N.14 33 45.9	7.470	0	10 50 1.58	2.4209	N. 6 55 48.7	11.056
1	8 52 35.83	2.5661	14 26 14.5	7.576	1	10 52 26.73	2.4174	6 44 44.2	11.093
2	8 55 9.73	2.5639	14 18 36.8	7.681	2	10 54 51.67	2.4139	6 33 37.5	11.129
3	8 57 43.50	2.5617	14 10 52.8	7.785	3	10 57 16.40	2.4105	6 22 28.7	11.164
4	9 0 17.13	2.5593	14 3 2.6	7.888	4	10 59 40.93	2.4071	6 11 17.8	11.197
5	9 2 50.61	2.5568	13 55 6.2	7.991	5	11 2 5.25	2.4036	6 0 5.0	11.229
6	9 5 23.95	2.5544	13 47 3.7	8.092	6	11 4 29.36	2.4002	5 48 50.3	11.260
7	9 7 57.14	2.5519	13 38 55.2	8.192	7	11 6 53.27	2.3967	5 37 33.8	11.288
8	9 10 30.18	2.5494	13 30 40.7	8.290	8	11 9 16.97	2.3933	5 26 15.7	11.314
9	9 13 3.07	2.5468	13 22 20.4	8.387	9	11 11 40.47	2.3900	5 14 56.1	11.339
10	9 15 35.80	2.5442	13 13 54.3	8.482	10	11 14 3.77	2.3866	5 3 35.0	11.364
11	9 18 8.37	2.5414	13 5 22.5	8.577	11	11 16 26.86	2.3832	4 52 12.4	11.387
12	9 20 40.77	2.5386	·12 56 45.1	8.670	12	11 18 49.75	2.3798	4 40 48.5	11.408
13	9 23 13.00	2.5358	12 48 2.1	8.762	13	11 21 12.44	2.3765	4 29 23.4	11.427
14	9 25 45.07	2.5331	12 39 13.6	8.852	14	11 23 34.93	2.3732	4 17 57.2	11.446
15	9 28 16.97	2.5302	12 30 19.8	8.941	15	11 25 57.22	2.3698	4 6 30.0	11.461
16	9 30 48.69	2.5272	12 21 20.7	9.029	16	11 28 19.31	2.3666	3 55 1.9	11.476
17	9 33 20.24	2.5243	12 12 16.3	9.117	17	11 30 41.21	2.3633	3 43 32.9	11.490
18	9 35 51.61	2.5213	12 3 6.7	9.202	18	11 33 2.91	2.3601	3 32 3.1	11.502
19	9 38 22.80	2.5182	11 53 52.1	9.285	19	11 35 24.42	2.3568	3 20 32.6	11.512
20	9 40 53.80	2.5152	11 44 32.5	9.367	20	11 37 45.73	2.3536	3 9 1.6	11.521
21	9 43 24.62	2.5121	11 35 8.1	9.447	21	11 40 6.85	2.3504	2 57 30.1	11.528
22	9 45 55.25	2.5089	11 25 38.9	9.527	22	11 42 27.78	2.3473	2 45 58.2	11.535
23	9 48 25.69	2.5058	N.11 16 4.9	9.605	23	11 44 48.52	2.3442	N. 2 34 25.9	11.540
	THURSDAY 18.					**SATURDAY 20.**			
0	9 50 55.95	2.5027	N.11 6 26.3	9.681	0	11 47 9.08	2.3411	N. 2 22 53.4	11.543
1	9 53 26.01	2.4994	10 56 43.2	9.756	1	11 49 29.45	2.3379	2 11 20.7	11.545
2	9 55 55.87	2.4961	10 46 55.6	9.829	2	11 51 49.63	2.3348	1 59 48.0	11.546
3	9 58 25.54	2.4928	10 37 3.7	9.901	3	11 54 9.62	2.3317	1 48 15.3	11.544
4	10 0 55.01	2.4895	10 27 7.5	9.972	4	11 56 29.43	2.3287	1 36 42.7	11.542
5	10 3 24.28	2.4862	10 17 7.1	10.041	5	11 58 49.07	2.3258	1 25 10.2	11.539
6	10 5 53.36	2.4829	10 7 2.6	10.108	6	12 1 8.53	2.3228	1 13 38.0	11.533
7	10 8 22.23	2.4795	9 56 54.2	10.173	7	12 3 27.81	2.3198	1 2 6.2	11.527
8	10 10 50.90	2.4762	9 46 41.8	10.238	8	12 5 46.91	2.3169	0 50 34.7	11.521
9	10 13 19.37	2.4728	9 36 25.6	10.301	9	12 8 5.84	2.3140	0 39 3.7	11.512
10	10 15 47.63	2.4693	9 26 5.7	10.362	10	12 10 24.59	2.3111	0 27 33.3	11.501
11	10 18 15.69	2.4659	9 15 42.2	10.422	11	12 12 43.17	2.3082	0 16 3.6	11.489
12	10 20 43.54	2.4625	9 5 15.1	10.480	12	12 15 1.58	2.3054	N. 0 4 34.6	11.477
13	10 23 11.19	2.4591	8 54 44.6	10.537	13	12 17 19.82	2.3027	S. 0 6 53.6	11.463
14	10 25 38.63	2.4556	8 44 10.7	10.592	14	12 19 37.90	2.2999	0 18 20.9	11.447
15	10 28 5.86	2.4521	8 33 33.6	10.645	15	12 21 55.81	2.2972	0 29 47.2	11.430
16	10 30 32.88	2.4487	8 22 53.3	10.697	16	12 24 13.56	2.2945	0 41 12.5	11.412
17	10 32 59.70	2.4452	8 12 10.0	10.747	17	12 26 31.15	2.2918	0 52 36.7	11.393
18	10 35 26.31	2.4417	8 1 23.7	10.796	18	12 28 48.58	2.2892	1 3 59.7	11.373
19	10 37 52.71	2.4382	7 50 34.5	10.843	19	12 31 5.85	2.2866	1 15 21.5	11.352
20	10 40 18.90	2.4347	7 39 42.5	10.888	20	12 33 22.97	2.2840	1 26 41.9	11.328
21	10 42 44.88	2.4312	7 28 47.9	10.932	21	12 35 39.93	2.2814	1 38 0.9	11.304
22	10 45 10.65	2.4278	7 17 50.7	10.975	22	12 37 56.74	2.2789	1 49 18.4	11.280
23	10 47 36.22	2.4244	7 6 50.9	11.017	23	12 40 13.40	2.2764	2 0 34.5	11.255
24	10 50 1.58	2.4209	N. 6 55 48.7	11.056	24	12 42 29.91	2.2739	S. 2 11 49.0	11.227

GREENWICH MEAN TIME.

THE MOON'S RIGHT ASCENSION AND DECLINATION.

THURSDAY 25.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
	h m s	s	° ′ ″	″
0	16 13 25.32	2.1498	S. 15 55 56.1	5.038
1	16 15 34.29	2.1492	16 0 55.8	4.953
2	16 17 43.22	2.1485	16 5 50.4	4.867
3	16 19 52.11	2.1478	16 10 39.8	4.780
4	16 22 0.96	2.1472	16 15 24.0	4.694
5	16 24 9.77	2.1465	16 20 3.0	4.608
6	16 26 18.54	2.1458	16 24 36.9	4.522
7	16 28 27.27	2.1452	16 29 5.6	4.435
8	16 30 35.96	2.1445	16 33 29.1	4.347
9	16 32 44.61	2.1438	16 37 47.3	4.260
10	16 34 53.22	2.1431	16 42 0.3	4.173
11	16 37 1.78	2.1423	16 46 8.1	4.087
12	16 39 10.30	2.1417	16 50 10.7	3.999
13	16 41 18.78	2.1410	16 54 8.0	3.912
14	16 43 27.22	2.1403	16 58 0.1	3.824
15	16 45 35.62	2.1396	17 1 46.9	3.737
16	16 47 43.98	2.1389	17 5 28.5	3.649
17	16 49 52.29	2.1382	17 9 4.8	3.562
18	16 52 0.56	2.1375	17 12 35.9	3.474
19	16 54 8.79	2.1367	17 16 1.7	3.386
20	16 56 16.97	2.1360	17 19 22.2	3.297
21	16 58 25.11	2.1352	17 22 37.4	3.209
22	17 0 33.20	2.1345	17 25 47.3	3.122
23	17 2 41.25	2.1337	S. 17 28 52.0	3.034

FRIDAY 26.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
0	17 4 49.25	2.1330	S. 17 31 51.4	2.946
1	17 6 57.21	2.1322	17 34 45.5	2.857
2	17 9 5.12	2.1314	17 37 34.3	2.769
3	17 11 12.98	2.1307	17 40 17.8	2.681
4	17 13 20.80	2.1299	17 42 56.0	2.593
5	17 15 28.57	2.1291	17 45 28.9	2.505
6	17 17 36.29	2.1282	17 47 56.6	2.417
7	17 19 43.96	2.1274	17 50 19.0	2.328
8	17 21 51.58	2.1266	17 52 36.0	2.239
9	17 23 59.15	2.1257	17 54 47.7	2.151
10	17 26 6.67	2.1249	17 56 54.2	2.063
11	17 28 14.14	2.1240	17 58 55.3	1.974
12	17 30 21.55	2.1231	18 0 51.1	1.886
13	17 32 28.91	2.1222	18 2 41.6	1.798
14	17 34 36.22	2.1214	18 4 26.9	1.711
15	17 36 43.48	2.1205	18 6 6.9	1.622
16	17 38 50.68	2.1196	18 7 41.6	1.534
17	17 40 57.83	2.1187	18 9 11.0	1.447
18	17 43 4.92	2.1177	18 10 35.2	1.359
19	17 45 11.95	2.1167	18 11 54.1	1.271
20	17 47 18.93	2.1158	18 13 7.7	1.182
21	17 49 25.85	2.1148	18 14 16.0	1.094
22	17 51 32.71	2.1138	18 15 19.0	1.007
23	17 53 39.51	2.1129	18 16 16.8	0.919
24	17 55 46.26	2.1120	S. 18 17 9.3	0.832

SATURDAY 27.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
	h m s	s	° ′ ″	″
0	17 55 46.26	2.1120	S. 18 17 9.3	0.832
1	17 57 52.95	2.1109	18 17 56.6	0.744
2	17 59 59.57	2.1098	18 18 38.6	0.657
3	18 2 6.13	2.1088	18 19 15.4	0.570
4	18 4 12.63	2.1077	18 19 47.0	0.483
5	18 6 19.06	2.1067	18 20 13.3	0.396
6	18 8 25.43	2.1057	18 20 34.5	0.310
7	18 10 31.74	2.1046	18 20 50.5	0.222
8	18 12 37.98	2.1034	18 21 1.2	0.135
9	18 14 44.15	2.1023	18 21 6.7	− 0.048
10	18 16 50.26	2.1012	18 21 7.0	+ 0.038
11	18 18 56.30	2.1001	18 21 2.2	0.124
12	18 21 2.27	2.0989	18 20 52.2	0.210
13	18 23 8.17	2.0978	18 20 37.0	0.296
14	18 25 14.00	2.0967	18 20 16.7	0.382
15	18 27 19.77	2.0956	18 19 51.2	0.467
16	18 29 25.47	2.0943	18 19 20.6	0.552
17	18 31 31.09	2.0931	18 18 44.9	0.637
18	18 33 36.64	2.0919	18 18 4.1	0.723
19	18 35 42.12	2.0907	18 17 18.1	0.808
20	18 37 47.52	2.0894	18 16 27.1	0.893
21	18 39 52.85	2.0882	18 15 31.0	0.977
22	18 41 58.10	2.0869	18 14 29.8	1.062
23	18 44 3.28	2.0857	S. 18 13 23.6	1.146

SUNDAY 28.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
0	18 46 8.38	2.0844	S. 18 12 12.3	1.230
1	18 48 13.40	2.0831	18 10 56.0	1.313
2	18 50 18.35	2.0818	18 9 34.7	1.397
3	18 52 23.22	2.0805	18 8 8.3	1.481
4	18 54 28.01	2.0792	18 6 36.9	1.564
5	18 56 32.72	2.0779	18 5 0.6	1.647
6	18 58 37.36	2.0766	18 3 19.3	1.730
7	19 0 41.92	2.0752	18 1 33.0	1.812
8	19 2 46.39	2.0738	17 59 41.8	1.894
9	19 4 50.78	2.0725	17 57 45.7	1.976
10	19 6 55.09	2.0712	17 55 44.7	2.057
11	19 8 59.32	2.0697	17 53 38.8	2.139
12	19 11 3.46	2.0683	17 51 28.0	2.221
13	19 13 7.52	2.0670	17 49 12.3	2.302
14	19 15 11.50	2.0656	17 46 51.8	2.382
15	19 17 15.39	2.0642	17 44 26.4	2.463
16	19 19 19.20	2.0627	17 41 56.2	2.543
17	19 21 22.92	2.0612	17 39 21.2	2.622
18	19 23 26.55	2.0598	17 36 41.5	2.702
19	19 25 30.10	2.0584	17 33 57.0	2.782
20	19 27 33.56	2.0569	17 31 7.7	2.861
21	19 29 36.93	2.0555	17 28 13.7	2.939
22	19 31 40.22	2.0541	17 25 15.0	3.018
23	19 33 43.42	2.0526	17 22 11.6	3.097
24	19 35 46.53	2.0511	S. 17 19 3.4	3.175

GREENWICH MEAN TIME.

PHASES OF THE MOON.

		d	h	m
● New Moon	February	3	15	14.6
☽ First Quarter		11	14	46.2
○ Full Moon		18	6	15.0
☾ Last Quarter		25	5	11.3

		d	h
☾ Apogee	February	2	22.3
☾ Perigee		17	14.1

[illegible]

GREENWICH MEAN TIME.

THE MOON'S

Day of the Month.	SEMIDIAMETER.		HORIZONTAL PARALLAX.				UPPER TRANSIT.		AGE.
	Noon.	Midnight.	Noon.	Diff. for 1 Hour.	Midnight.	Diff. for 1 Hour.	Meridian of Greenwich.	Diff. for 1 Hour.	Noon.
	′ ″	′ ″	′ ″	″	′ ″	″	h m	m	d
1	14 45.9	14 44.9	54 4.4	−0.39	54 0.8	−0.22	21 39.4	1.91	25.4
2	14 44.5	14 44.6	53 59.2	−0.06	53 59.4	+0.09	22 24.9	1.87	26.4
3	14 45.0	14 46.0	54 1.2	+0.21	54 4.6	0.34	23 9.5	1.84	27.4
4	14 47.3	14 48.9	54 9.4	+0.46	54 15.5	+0.56	23 53.4	1.82	28.4
5	14 50.9	14 53.2	54 22.8	0.65	54 31.2	0.74	δ		29.4
6	14 55.8	14 58.6	54 40.6	0.83	54 51.0	0.90	0 37.1	1.82	0.6
7	15 1.7	15 4.9	55 2.2	+0.97	55 14.3	+1.05	1 21.0	1.84	1.6
8	15 8.5	15 12.3	55 27.3	1.12	55 41.2	1.19	2 5.6	1.88	2.6
9	15 16.3	15 20.5	55 56.0	1.27	56 11.6	1.34	2 51.5	1.95	3.6
10	15 25.0	15 29.8	56 28.1	+1.41	56 45.5	+1.48	3 39.2	2.04	4.6
11	15 34.7	15 39.9	57 3.7	1.55	57 22.7	1.61	4 29.3	2.14	5.6
12	15 45.3	15 50.8	57 42.4	1.66	58 2.6	1.69	5 22.0	2.25	6.6
13	15 56.3	16 1.9	58 23.0	+1.71	58 43.5	+1.70	6 17.2	2.35	7.6
14	16 7.4	16 12.7	59 3.7	1.66	59 23.2	1.58	7 14.3	2.41	8.6
15	16 17.7	16 22.3	59 41.6	1.46	59 58.3	1.31	8 12.6	2.43	9.6
16	16 26.2	16 29.5	60 12.9	+1.11	60 24.8	+0.87	9 10.9	2.42	10.6
17	16 31.9	16 33.4	60 33.6	+0.59	60 39.0	+0.29	10 8.4	2.37	11.6
18	16 33.8	16 33.1	60 40.6	−0.04	60 38.1	−0.38	11 4.7	2.31	12.6
19	16 31.3	16 28.4	60 31.5	−0.72	60 20.9	−1.04	11 59.6	2.26	13.6
20	16 24.5	16 19.6	60 6.5	1.35	59 48.6	1.61	12 53.2	2.21	14.6
21	16 14.0	16 7.7	59 27.8	1.83	59 4.6	2.01	13 45.8	2.18	15.6
22	16 0.8	15 53.7	58 39.5	−2.14	58 13.2	−2.22	14 37.8	2.15	16.6
23	15 46.3	15 39.0	57 46.3	2.24	57 19.4	2.22	15 29.3	2.13	17.6
24	15 31.8	15 24.9	56 53.0	2.16	56 27.6	2.06	16 20.2	2.11	18.6
25	15 18.4	15 12.3	56 3.6	−1.93	55 41.3	−1.77	17 10.4	2.07	19.6
26	15 6.8	15 1.9	55 21.1	1.59	55 3.2	1.40	17 59.7	2.03	20.6
27	14 57.7	14 54.1	54 47.6	1.20	54 34.5	0.98	18 47.9	1.98	21.6
28	14 51.3	14 49.1	54 24.0	−0.77	54 16.1	−0.55	19 34.9	1.93	22.6
29	14 47.6	14 46.8	54 10.7	−0.35	54 7.8	−0.15	20 20.8	1.89	23.6
30	14 46.7	14 47.1	54 7.2	+0.05	54 8.8	+0.23	21 5.6	1.85	24.6
31	14 48.1	14 49.7	54 12.6	0.39	54 18.3	0.55	21 49.7	1.83	25.6
32	14 51.7	14 54.2	54 25.8	+0.69	54 34.9	+0.81	22 33.6	1.83	26.6

GREENWICH MEAN TIME.

THE MOON'S RIGHT ASCENSION AND DECLINATION.

MONDAY 1.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
	h m s	s	° ′ ″	″
0	19 35 46.53	2.0511	S. 17 19 3.4	3.175
1	19 37 49.55	2.0496	17 15 50.6	3.252
2	19 39 52.48	2.0482	17 12 33.2	3.329
3	19 41 55.33	2.0467	17 9 11.1	3.407
4	19 43 58.09	2.0452	17 5 44.4	3.483
5	19 46 0.75	2.0436	17 2 13.1	3.559
6	19 48 3.32	2.0421	16 58 37.3	3.635
7	19 50 5.80	2.0406	16 54 56.9	3.711
8	19 52 8.19	2.0392	16 51 12.0	3.786
9	19 54 10.50	2.0377	16 47 22.6	3.861
10	19 56 12.72	2.0362	16 43 28.7	3.936
11	19 58 14.84	2.0346	16 39 30.3	4.011
12	20 0 16.87	2.0331	16 35 27.4	4.085
13	20 2 18.81	2.0316	16 31 20.1	4.158
14	20 4 20.66	2.0301	16 27 8.4	4.231
15	20 6 22.42	2.0286	16 22 52.3	4.304
16	20 8 24.09	2.0270	16 18 31.9	4.377
17	20 10 25.66	2.0254	16 14 7.1	4.449
18	20 12 27.14	2.0239	16 9 38.0	4.521
19	20 14 28.53	2.0224	16 5 4.6	4.592
20	20 16 29.83	2.0209	16 0 26.9	4.664
21	20 18 31.04	2.0194	15 55 44.9	4.735
22	20 20 32.16	2.0178	15 50 58.7	4.805
23	20 22 33.18	2.0162	S. 15 46 8.3	4.874

TUESDAY 2.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
0	20 24 34.11	2.0147	S. 15 41 13.8	4.943
1	20 26 34.95	2.0132	15 36 15.1	5.013
2	20 28 35.70	2.0117	15 31 12.2	5.082
3	20 30 36.36	2.0102	15 26 5.2	5.151
4	20 32 36.93	2.0087	15 20 54.1	5.219
5	20 34 37.41	2.0072	15 15 38.9	5.287
6	20 36 37.80	2.0057	15 10 19.7	5.354
7	20 38 38.09	2.0042	15 4 56.4	5.421
8	20 40 38.30	2.0027	14 59 29.2	5.487
9	20 42 38.42	2.0012	14 53 58.0	5.552
10	20 44 38.45	1.9997	14 48 22.9	5.617
11	20 46 38.39	1.9982	14 42 43.9	5.683
12	20 48 38.24	1.9967	14 37 0.9	5.748
13	20 50 38.00	1.9953	14 31 14.1	5.812
14	20 52 37.68	1.9939	14 25 23.5	5.876
15	20 54 37.27	1.9924	14 19 29.0	5.940
16	20 56 36.77	1.9910	14 13 30.7	6.003
17	20 58 36.19	1.9896	14 7 28.7	6.065
18	21 0 35.52	1.9881	14 1 22.9	6.127
19	21 2 34.76	1.9867	13 55 13.4	6.189
20	21 4 33.92	1.9853	13 49 0.2	6.250
21	21 6 33.00	1.9839	13 42 43.4	6.311
22	21 8 31.99	1.9825	13 36 22.9	6.372
23	21 10 30.90	1.9812	13 29 58.8	6.431
24	21 12 29.73	1.9798	S. 13 23 31.2	6.490

WEDNESDAY 3.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
	h m s	s	° ′ ″	″
0	21 12 29.73	1.9798	S. 13 23 31.2	6.490
1	21 14 28.48	1.9784	13 17 0.0	6.549
2	21 16 27.14	1.9770	13 10 25.3	6.608
3	21 18 25.72	1.9757	13 3 47.1	6.666
4	21 20 24.22	1.9744	12 57 5.4	6.723
5	21 22 22.65	1.9732	12 50 20.3	6.780
6	21 24 21.00	1.9718	12 43 31.8	6.837
7	21 26 19.27	1.9705	12 36 39.9	6.892
8	21 28 17.46	1.9692	12 29 44.7	6.947
9	21 30 15.58	1.9680	12 22 46.2	7.002
10	21 32 13.62	1.9668	12 15 44.4	7.057
11	21 34 11.59	1.9656	12 8 39.3	7.112
12	21 36 9.49	1.9643	12 1 30.9	7.166
13	21 38 7.31	1.9631	11 54 19.4	7.219
14	21 40 5.06	1.9619	11 47 4.7	7.272
15	21 42 2.74	1.9607	11 39 46.8	7.324
16	21 44 0.35	1.9596	11 32 25.8	7.375
17	21 45 57.89	1.9585	11 25 1.8	7.426
18	21 47 55.37	1.9574	11 17 34.7	7.477
19	21 49 52.78	1.9563	11 10 4.5	7.527
20	21 51 50.12	1.9552	11 2 31.4	7.577
21	21 53 47.40	1.9542	10 54 55.3	7.626
22	21 55 44.62	1.9531	10 47 16.3	7.674
23	21 57 41.77	1.9520	S. 10 39 34.4	7.722

THURSDAY 4.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
0	21 59 38.86	1.9510	S. 10 31 49.6	7.770
1	22 1 35.89	1.9500	10 24 2.0	7.817
2	22 3 32.86	1.9491	10 16 11.6	7.864
3	22 5 29.78	1.9482	10 8 18.3	7.911
4	22 7 26.64	1.9472	10 0 22.3	7.956
5	22 9 23.44	1.9462	9 52 23.6	8.000
6	22 11 20.19	1.9453	9 44 22.3	8.044
7	22 13 16.88	1.9445	9 36 18.3	8.088
8	22 15 13.53	1.9437	9 28 11.7	8.131
9	22 17 10.13	1.9429	9 20 2.5	8.174
10	22 19 6.68	1.9421	9 11 50.8	8.217
11	22 21 3.18	1.9413	9 3 36.5	8.259
12	22 22 59.64	1.9406	8 55 19.7	8.300
13	22 24 56.06	1.9399	8 47 0.5	8.340
14	22 26 52.43	1.9391	8 38 38.9	8.381
15	22 28 48.75	1.9383	8 30 14.8	8.421
16	22 30 45.03	1.9377	8 21 48.4	8.460
17	22 32 41.28	1.9371	8 13 19.7	8.497
18	22 34 37.49	1.9365	8 4 48.8	8.534
19	22 36 33.66	1.9359	7 56 15.6	8.572
20	22 38 29.80	1.9354	7 47 40.2	8.609
21	22 40 25.91	1.9348	7 39 2.5	8.646
22	22 42 21.98	1.9343	7 30 22.7	8.681
23	22 44 18.03	1.9339	7 21 40.8	8.715
24	22 46 14.05	1.9334	S. 7 12 56.9	8.749

GREENWICH MEAN TIME.

THE MOON'S RIGHT ASCENSION AND DECLINATION.

FRIDAY 5.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
	h m s	s	° ′ ″	″
0	22 46 14.05	1.9334	S. 7 12 56.9	8.749
1	22 48 10.04	1.9330	7 4 10.9	8.783
2	22 50 6.01	1.9326	6 55 22.9	8.817
3	22 52 1.95	1.9322	6 46 32.8	8.851
4	22 53 57.87	1.9318	6 37 40.8	8.882
5	22 55 53.77	1.9316	6 28 47.0	8.913
6	22 57 49.66	1.9313	6 19 51.3	8.943
7	22 59 45.53	1.9310	6 10 53.8	8.974
8	23 1 41.38	1.9307	6 1 54.4	9.005
9	23 3 37.22	1.9305	5 52 53.2	9.034
10	23 5 33.04	1.9303	5 43 50.3	9.062
11	23 7 28.86	1.9302	5 34 45.8	9.089
12	23 9 24.67	1.9301	5 25 39.6	9.116
13	23 11 20.47	1.9300	5 16 31.8	9.143
14	23 13 16.27	1.9300	5 7 22.4	9.170
15	23 15 12.07	1.9299	4 58 11.4	9.196
16	23 17 7.86	1.9299	4 48 58.9	9.221
17	23 19 3.66	1.9300	4 39 44.9	9.245
18	23 20 59.46	1.9300	4 30 29.5	9.268
19	23 22 55.26	1.9301	4 21 12.7	9.292
20	23 24 51.07	1.9302	4 11 54.5	9.314
21	23 26 46.89	1.9304	4 2 35.0	9.336
22	23 28 42.72	1.9306	3 53 14.2	9.357
23	23 30 38.56	1.9308	S. 3 43 52.2	9.377

SATURDAY 6.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
0	23 32 34.42	1.9311	S. 3 34 28.9	9.397
1	23 34 30.29	1.9313	3 25 4.5	9.417
2	23 36 26.18	1.9317	3 15 38.9	9.436
3	23 38 22.09	1.9320	3 6 12.2	9.454
4	23 40 18.02	1.9324	2 56 44.4	9.472
5	23 42 13.98	1.9328	2 47 15.6	9.488
6	23 44 9.97	1.9333	2 37 45.8	9.504
7	23 46 5.98	1.9338	2 28 15.1	9.520
8	23 48 2.02	1.9343	2 18 43.4	9.536
9	23 49 58.10	1.9349	2 9 10.8	9.550
10	23 51 54.21	1.9354	1 59 37.4	9.564
11	23 53 50.35	1.9360	1 50 3.2	9.577
12	23 55 46.53	1.9367	1 40 28.2	9.589
13	23 57 42.75	1.9374	1 30 52.5	9.601
14	23 59 39.02	1.9382	1 21 16.1	9.612
15	0 1 35.33	1.9389	1 11 39.1	9.622
16	0 3 31.69	1.9397	1 2 1.5	9.632
17	0 5 28.10	1.9405	0 52 23.3	9.642
18	0 7 24.55	1.9413	0 42 44.5	9.651
19	0 9 21.06	1.9422	0 33 5.2	9.658
20	0 11 17.62	1.9432	0 23 25.6	9.664
21	0 13 14.24	1.9442	0 13 45.6	9.670
22	0 15 10.92	1.9452	S. 0 4 5.2	9.677
23	0 17 7.66	1.9462	N. 0 5 35.6	9.682
24	0 19 4.47	1.9473	N. 0 15 16.7	9.687

SUNDAY 7.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
	h m s	s	° ′ ″	″
0	0 19 4.47	1.9473	N. 0 15 16.7	9.687
1	0 21 1.34	1.9484	0 24 58.0	9.690
2	0 22 58.28	1.9496	0 34 39.5	9.693
3	0 24 55.29	1.9508	0 44 21.2	9.695
4	0 26 52.37	1.9520	0 54 3.0	9.697
5	0 28 49.53	1.9532	1 3 44.9	9.698
6	0 30 46.76	1.9545	1 13 26.8	9.698
7	0 32 44.07	1.9558	1 23 8.7	9.698
8	0 34 41.46	1.9572	1 32 50.6	9.697
9	0 36 38.94	1.9587	1 42 32.4	9.696
10	0 38 36.51	1.9602	1 52 14.1	9.694
11	0 40 34.16	1.9616	2 1 55.6	9.691
12	0 42 31.90	1.9632	2 11 37.0	9.687
13	0 44 29.74	1.9647	2 21 18.1	9.682
14	0 46 27.67	1.9662	2 30 58.9	9.677
15	0 48 25.69	1.9678	2 40 39.3	9.671
16	0 50 23.81	1.9695	2 50 19.4	9.664
17	0 52 22.03	1.9712	2 59 59.0	9.657
18	0 54 20.36	1.9730	3 9 38.2	9.649
19	0 56 18.79	1.9748	3 19 16.9	9.640
20	0 58 17.33	1.9766	3 28 55.0	9.630
21	1 0 15.98	1.9785	3 38 32.5	9.620
22	1 2 14.75	1.9804	3 48 9.4	9.610
23	1 4 13.63	1.9823	N. 3 57 45.7	9.599

MONDAY 8.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
0	1 6 12.62	1.9842	N. 4 7 21.3	9.586
1	1 8 11.73	1.9862	4 16 56.1	9.572
2	1 10 10.97	1.9883	4 26 30.0	9.558
3	1 12 10.33	1.9904	4 36 3.1	9.544
4	1 14 9.82	1.9926	4 45 35.3	9.528
5	1 16 9.44	1.9947	4 55 6.5	9.512
6	1 18 9.18	1.9968	5 4 36.8	9.496
7	1 20 9.06	1.9991	5 14 6.0	9.478
8	1 22 9.07	2.0013	5 23 34.1	9.460
9	1 24 9.22	2.0036	5 33 1.2	9.442
10	1 26 9.50	2.0059	5 42 27.1	9.422
11	1 28 9.93	2.0083	5 51 51.8	9.401
12	1 30 10.50	2.0107	6 1 15.2	9.379
13	1 32 11.22	9.0132	6 10 37.3	9.357
14	1 34 12.08	2.0156	6 19 58.1	9.335
15	1 36 13.09	2.0182	6 29 17.5	9.311
16	1 38 14.26	2.0207	6 38 35.4	9.287
17	1 40 15.58	2.0233	6 47 51.9	9.262
18	1 42 17.06	2.0260	6 57 6.9	9.236
19	1 44 18.70	2.0287	7 6 20.3	9.209
20	1 46 20.50	2.0313	7 15 32.0	9.182
21	1 48 22.46	2.0341	7 24 42.1	9.154
22	1 50 24.59	2.0368	7 33 50.5	9.125
23	1 52 26.88	2.0396	7 42 57.1	9.094
24	1 54 29.34	2.0424	N. 7 52 1.8	[illegible]

GREENWICH MEAN TIME.

THE MOON'S RIGHT ASCENSION AND DECLINATION.

TUESDAY 9.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
	h m s	s	° ′ ″	″
0	1 54 29.34	2.0424	N. 7 52 1.8	9.063
1	1 56 31.97	2.0453	8 1 4.7	9.032
2	1 58 34.78	2.0482	8 10 5.7	9.001
3	2 0 37.76	2.0512	8 19 4.8	8.968
4	2 2 40.92	2.0542	8 28 1.9	8.934
5	2 4 44.26	2.0572	8 36 56.9	8.900
6	2 6 47.78	2.0602	8 45 49.9	8.865
7	2 8 51.48	2.0633	8 54 40.7	8.829
8	2 10 55.37	2.0664	9 3 29.3	8.792
9	2 12 59.45	2.0696	9 12 15.7	8.754
10	2 15 3.72	2.0727	9 20 59.8	8.715
11	2 17 8.18	2.0759	9 29 41.5	8.676
12	2 19 12.83	2.0792	9 38 20.9	8.637
13	2 21 17.68	2.0824	9 46 57.9	8.595
14	2 23 22.72	2.0857	9 55 32.3	8.553
15	2 25 27.96	2.0890	10 4 4.2	8.510
16	2 27 33.40	2.0923	10 12 33.5	8.467
17	2 29 39.04	2.0957	10 21 0.2	8.422
18	2 31 44.89	2.0992	10 29 24.2	8.377
19	2 33 50.95	2.1027	10 37 45.5	8.332
20	2 35 57.21	2.1061	10 46 4.0	8.285
21	2 38 3.68	2.1096	10 54 19.7	8.237
22	2 40 10.36	2.1131	11 2 32.5	8.189
23	2 42 17.25	2.1167	N.11 10 42.4	8.140

WEDNESDAY 10.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
0	2 44 24.36	2.1202	N.11 18 49.3	8.089
1	2 46 31.68	2.1238	11 26 53.1	8.038
2	2 48 39.22	2.1275	11 34 53.9	7.987
3	2 50 46.98	2.1312	11 42 51.6	7.935
4	2 52 54.96	2.1348	11 50 46.1	7.881
5	2 55 3.16	2.1385	11 58 37.3	7.827
6	2 57 11.58	2.1422	12 6 25.3	7.772
7	2 59 20.23	2.1460	12 14 9.9	7.716
8	3 1 29.10	2.1498	12 21 51.2	7.659
9	3 3 38.20	2.1536	12 29 29.0	7.601
10	3 5 47.53	2.1574	12 37 3.3	7.542
11	3 7 57.09	2.1612	12 44 34.1	7.483
12	3 10 6.88	2.1651	12 52 1.3	7.423
13	3 12 16.90	2.1690	12 59 24.9	7.362
14	3 14 27.16	2.1729	13 6 44.8	7.300
15	3 16 37.65	2.1768	13 14 0.9	7.237
16	3 18 48.37	2.1807	13 21 13.2	7.173
17	3 20 59.33	2.1847	13 28 21.7	7.109
18	3 23 10.53	2.1887	13 35 26.3	7.043
19	3 25 21.97	2.1926	13 42 26.9	6.977
20	3 27 33.64	2.1965	13 49 23.6	6.911
21	3 29 45.55	2.2005	13 56 16.2	6.843
22	3 31 57.70	2.2045	14 3 4.7	6.774
23	3 34 10.09	2.2086	14 9 49.1	6.704
24	3 36 22.73	2.2127	N.14 16 29.2	6.633

THURSDAY 11.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
	h m s	s	° ′ ″	″
0	3 36 22.73	2.2127	N.14 16 29.2	6.633
1	3 38 35.61	2.2167	14 23 5.1	6.562
2	3 40 48.73	2.2207	14 29 36.7	6.490
3	3 43 2.09	2.2247	14 36 3.9	6.417
4	3 45 15.70	2.2288	14 42 26.7	6.342
5	3 47 29.55	2.2329	14 48 45.0	6.267
6	3 49 43.65	2.2370	14 54 58.8	6.192
7	3 51 57.99	2.2411	15 1 8.0	6.115
8	3 54 12.58	2.2452	15 7 12.6	6.038
9	3 56 27.41	2.2492	15 13 12.6	5.961
10	3 58 42.48	2.2533	15 19 7.9	5.882
11	4 0 57.80	2.2574	15 24 58.4	5.801
12	4 3 13.37	2.2615	15 30 44.0	5.719
13	4 5 29.18	2.2656	15 36 24.7	5.636
14	4 7 45.24	2.2697	15 42 0.6	5.555
15	4 10 1.55	2.2738	15 47 31.5	5.473
16	4 12 18.10	2.2778	15 52 57.4	5.389
17	4 14 34.89	2.2819	15 58 18.2	5.304
18	4 16 51.93	2.2860	16 3 33.9	5.218
19	4 19 9.21	2.2901	16 8 44.4	5.132
20	4 21 26.74	2.2942	16 13 49.7	5.044
21	4 23 44.51	2.2982	16 18 49.7	4.956
22	4 26 2.52	2.3022	16 23 44.4	4.867
23	4 28 20.78	2.3063	N.16 28 33.7	4.777

FRIDAY 12.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
0	4 30 39.28	2.3103	N.16 33 17.7	4.687
1	4 32 58.02	2.3143	16 37 56.2	4.595
2	4 35 17.00	2.3182	16 42 29.1	4.502
3	4 37 36.21	2.3222	16 46 56.5	4.410
4	4 39 55.66	2.3262	16 51 18.3	4.316
5	4 42 15.35	2.3302	16 55 34.4	4.221
6	4 44 35.28	2.3341	16 59 44.8	4.125
7	4 46 55.44	2.3379	17 3 49.4	4.029
8	4 49 15.83	2.3418	17 7 48.3	3.933
9	4 51 36.46	2.3457	17 11 41.4	3.836
10	4 53 57.32	2.3496	17 15 28.6	3.737
11	4 56 18.41	2.3534	17 19 9.8	3.637
12	4 58 39.72	2.3571	17 22 45.0	3.537
13	5 1 1.26	2.3608	17 26 14.2	3.437
14	5 3 23.02	2.3646	17 29 37.4	3.336
15	5 5 45.01	2.3683	17 32 54.5	3.233
16	5 8 7.22	2.3720	17 36 5.4	3.130
17	5 10 29.65	2.3756	17 39 10.1	3.027
18	5 12 52.29	2.3792	17 42 8.7	2.924
19	5 15 15.15	2.3828	17 45 1.0	2.818
20	5 17 38.22	2.3864	17 47 46.9	2.712
21	5 20 1.51	2.3899	17 50 26.5	2.606
22	5 22 25.01	2.3933	17 52 59.7	2.499
23	5 24 48.71	2.3967	17 55 26.4	2.392
24	5 27 12.61	2.4001	N.17 57 46.7	2.284

GREENWICH MEAN TIME.

THE MOON'S RIGHT ASCENSION AND DECLINATION.

WEDNESDAY 17.

Hour.	Right Ascension. h m s	Diff. for 1 Minute. s	Declination. ° ′ ″	Diff. for 1 Minute. ″
0	9 25 6.08	2.4669	N. 12 40 58.5	8.584
1	9 27 34.04	2.4651	12 32 20.8	8.672
2	9 30 1.89	2.4633	12 23 37.8	8.760
3	9 32 29.64	2.4615	12 14 49.6	8.846
4	9 34 57.27	2.4596	12 5 56.3	8.930
5	9 37 24.79	2.4577	11 56 58.0	9.014
6	9 39 52.19	2.4557	11 47 54.6	9.097
7	9 42 19.47	2.4537	11 38 46.3	9.178
8	9 44 46.63	2.4517	11 29 33.2	9.258
9	9 47 13.68	2.4498	11 20 15.3	9.337
10	9 49 40.61	2.4478	11 10 52.7	9.415
11	9 52 7.41	2.4457	11 1 25.5	9.491
12	9 54 34.09	2.4437	10 51 53.8	9.566
13	9 57 0.65	2.4416	10 42 17.6	9.640
14	9 59 27.08	2.4394	10 32 37.0	9.713
15	10 1 53.38	2.4373	10 22 52.0	9.785
16	10 4 19.56	2.4352	10 13 2.8	9.855
17	10 6 45.61	2.4331	10 3 9.4	9.923
18	10 9 11.53	2.4309	9 53 12.0	9.990
19	10 11 37.32	2.4287	9 43 10.6	10.057
20	10 14 2.98	2.4266	9 33 5.2	10.122
21	10 16 28.51	2.4244	9 22 55.9	10.186
22	10 18 53.91	2.4222	9 12 42.9	10.247
23	10 21 19.18	2.4201	N. 9 2 26.3	10.307

THURSDAY 18.

Hour.	Right Ascension. h m s	Diff. for 1 Minute. s	Declination. ° ′ ″	Diff. for 1 Minute. ″
0	10 23 44.32	2.4179	N. 8 52 6.0	10.367
1	10 26 9.33	2.4157	8 41 42.2	10.425
2	10 28 34.20	2.4134	8 31 15.0	10.482
3	10 30 58.94	2.4112	8 20 44.4	10.538
4	10 33 23.55	2.4090	8 10 10.5	10.592
5	10 35 48.02	2.4068	7 59 33.4	10.643
6	10 38 12.36	2.4046	7 48 53.3	10.694
7	10 40 36.57	2.4024	7 38 10.1	10.744
8	10 43 0.65	2.4002	7 27 24.0	10.792
9	10 45 24.59	2.3979	7 16 35.0	10.839
10	10 47 48.40	2.3957	7 5 43.3	10.884
11	10 50 12.08	2.3935	6 54 48.9	10.928
12	10 52 35.62	2.3913	6 43 51.9	10.971
13	10 54 59.03	2.3891	6 32 52.4	11.012
14	10 57 22.31	2.3869	6 21 50.5	11.052
15	10 59 45.46	2.3847	6 10 46.2	11.091
16	11 2 8.47	2.3824	5 59 39.6	11.127
17	11 4 31.35	2.3802	5 48 30.9	11.162
18	11 6 54.10	2.3781	5 37 20.2	11.195
19	11 9 16.72	2.3759	5 26 7.5	11.228
20	11 11 39.21	2.3738	5 14 52.8	11.260
21	11 14 1.57	2.3717	5 3 36.3	11.289
22	11 16 23.81	2.3696	4 52 18.1	11.317
23	11 18 45.92	2.3674	4 40 58.3	11.343
24	11 21 7.90	2.3653	N. 4 29 36.9	11.369

FRIDAY 19.

Hour.	Right Ascension. h m s	Diff. for 1 Minute. s	Declination. ° ′ ″	Diff. for 1 Minute. ″
0	11 21 7.90	2.3653	N. 4 29 36.9	11.369
1	11 23 29.75	2.3632	4 18 14.0	11.392
2	11 25 51.48	2.3611	4 6 49.7	11.415
3	11 28 13.08	2.3590	3 55 24.2	11.436
4	11 30 34.56	2.3569	3 43 57.5	11.456
5	11 32 55.91	2.3548	3 32 29.6	11.473
6	11 35 17.14	2.3528	3 21 0.7	11.489
7	11 37 38.25	2.3508	3 9 30.9	11.504
8	11 39 59.24	2.3487	2 58 0.2	11.518
9	11 42 20.10	2.3467	2 46 28.7	11.531
10	11 44 40.84	2.3447	2 34 56.5	11.542
11	11 47 1.47	2.3428	2 23 23.7	11.551
12	11 49 21.98	2.3408	2 11 50.4	11.558
13	11 51 42.37	2.3389	2 0 16.7	11.565
14	11 54 2.65	2.3370	1 48 42.6	11.571
15	11 56 22.81	2.3351	1 37 8.2	11.574
16	11 58 42.86	2.3332	1 25 33.7	11.576
17	12 1 2.80	2.3313	1 13 59.1	11.577
18	12 3 22.62	2.3294	1 2 24.4	11.577
19	12 5 42.33	2.3276	0 50 49.8	11.575
20	12 8 1.93	2.3258	0 39 15.4	11.571
21	12 10 21.43	2.3241	0 27 41.3	11.566
22	12 12 40.82	2.3223	0 16 7.5	11.561
23	12 15 0.10	2.3205	N. 0 4 34.0	11.554

SATURDAY 20.

Hour.	Right Ascension. h m s	Diff. for 1 Minute. s	Declination. ° ′ ″	Diff. for 1 Minute. ″
0	12 17 19.28	2.3188	S. 0 6 59.0	11.545
1	12 19 38.36	2.3171	0 18 31.4	11.535
2	12 21 57.33	2.3153	0 30 3.2	11.523
3	12 24 16.20	2.3137	0 41 34.2	11.510
4	12 26 34.97	2.3120	0 53 4.4	11.497
5	12 28 53.64	2.3103	1 4 33.8	11.482
6	12 31 12.21	2.3087	1 16 2.2	11.465
7	12 33 30.69	2.3071	1 27 29.6	11.447
8	12 35 49.07	2.3055	1 38 55.8	11.427
9	12 38 7.35	2.3039	1 50 20.8	11.407
10	12 40 25.54	2.3024	2 1 44.6	11.386
11	12 42 43.64	2.3009	2 13 7.1	11.363
12	12 45 1.65	2.2994	2 24 28.1	11.337
13	12 47 19.57	2.2979	2 35 47.6	11.312
14	12 49 37.40	2.2964	2 47 5.6	11.286
15	12 51 55.14	2.2949	2 58 21.9	11.258
16	12 54 12.79	2.2935	3 9 36.5	11.228
17	12 56 30.36	2.2921	3 20 49.3	11.197
18	12 58 47.84	2.2907	3 32 0.2	11.166
19	13 1 5.24	2.2893	3 43 9.2	11.133
20	13 3 22.56	2.2879	3 54 16.2	11.099
21	13 5 39.79	2.2865	4 5 21.1	11.063
22	13 7 56.94	2.2852	4 16 23.8	11.027
23	13 10 14.02	2.2840	4 27 24.4	10.991
24	13 12 31.02	2.2827	S. 4 38 22.7	10.953

GREENWICH MEAN TIME.

THE MOON'S RIGHT ASCENSION AND DECLINATION.

SUNDAY 21.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
	h m s	s	° ′ ″	″
0	13 12 31.02	2.2827	S. 4 38 22.7	10.952
1	13 14 47.94	2.2814	4 49 18.6	10.912
2	13 17 4.79	2.2802	5 0 12.1	10.872
3	13 19 21.56	2.2789	5 11 3.2	10.830
4	13 21 38.26	2.2777	5 21 51.7	10.787
5	13 23 54.89	2.2765	5 32 37.6	10.742
6	13 26 11.44	2.2753	5 43 20.7	10.696
7	13 28 27.92	2.2742	5 54 1.1	10.650
8	13 30 44.34	2.2731	6 4 38.7	10.603
9	13 33 0.69	2.2719	6 15 13.5	10.556
10	13 35 16.97	2.2707	6 25 45.4	10.506
11	13 37 33.18	2.2696	6 36 14.2	10.455
12	13 39 49.32	2.2685	6 46 40.0	10.404
13	13 42 5.40	2.2675	6 57 2.7	10.352
14	13 44 21.42	2.2664	7 7 22.2	10.298
15	13 46 37.37	2.2653	7 17 38.5	10.244
16	13 48 53.26	2.2643	7 27 51.5	10.189
17	13 51 9.09	2.2632	7 38 1.2	10.133
18	13 53 24.85	2.2622	7 48 7.5	10.077
19	13 55 40.55	2.2612	7 58 10.4	10.018
20	13 57 56.20	2.2603	8 8 9.7	9.958
21	14 0 11.79	2.2593	8 18 5.4	9.898
22	14 2 27.32	2.2583	8 27 57.5	9.838
23	14 4 42.79	2.2573	S. 8 37 46.0	9.777

MONDAY 22.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
0	14 6 58.20	2.2564	S. 8 47 30.8	9.715
1	14 9 13.56	2.2555	8 57 11.8	9.652
2	14 11 28.86	2.2546	9 6 49.0	9.587
3	14 13 44.11	2.2537	9 16 22.3	9.522
4	14 15 59.30	2.2527	9 25 51.7	9.457
5	14 18 14.44	2.2518	9 35 17.1	9.391
6	14 20 29.52	2.2509	9 44 38.6	9.324
7	14 22 44.55	2.2501	9 53 56.0	9.256
8	14 24 59.53	2.2492	10 3 9.3	9.187
9	14 27 14.46	2.2483	10 12 18.5	9.118
10	14 29 29.33	2.2475	10 21 23.5	9.048
11	14 31 44.16	2.2467	10 30 24.2	8.977
12	14 33 58.94	2.2459	10 39 20.7	8.906
13	14 36 13.67	2.2450	10 48 12.9	8.833
14	14 38 28.34	2.2441	10 57 0.7	8.760
15	14 40 42.96	2.2432	11 5 44.1	8.687
16	14 42 57.53	2.2424	11 14 23.1	8.612
17	14 45 12.05	2.2417	11 22 57.6	8.537
18	14 47 26.53	2.2409	11 31 27.6	8.462
19	14 49 40.96	2.2400	11 39 53.0	8.386
20	14 51 55.33	2.2392	11 48 13.9	8.310
21	14 54 9.66	2.2384	11 56 30.2	8.232
22	14 56 23.94	2.2376	12 4 41.8	8.154
23	14 58 38.17	2.2368	12 12 48.7	8.075
24	15 0 52.36	2.2361	S. 12 20 50.8	7.996

TUESDAY 23.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
	h m s	s	° ′ ″	″
0	15 0 52.36	2.2361	S. 12 20 50.8	7.996
1	15 3 6.50	2.2353	12 28 48.2	7.917
2	15 5 20.59	2.2344	12 36 40.8	7.837
3	15 7 34.63	2.2336	12 44 28.7	7.757
4	15 9 48.62	2.2328	12 52 11.7	7.676
5	15 12 2.56	2.2320	12 59 49.8	7.593
6	15 14 16.46	2.2312	13 7 22.9	7.511
7	15 16 30.31	2.2304	13 14 51.1	7.429
8	15 18 44.11	2.2296	13 22 14.4	7.346
9	15 20 57.86	2.2287	13 29 32.7	7.263
10	15 23 11.56	2.2279	13 36 46.0	7.179
11	15 25 25.21	2.2271	13 43 54.2	7.094
12	15 27 38.81	2.2263	13 50 57.3	7.009
13	15 29 52.36	2.2254	13 57 55.3	6.924
14	15 32 5.86	2.2247	14 4 48.2	6.839
15	15 34 19.32	2.2239	14 11 36.0	6.753
16	15 36 32.73	2.2230	14 18 18.6	6.667
17	15 38 46.08	2.2221	14 24 56.0	6.581
18	15 40 59.38	2.2212	14 31 28.3	6.494
19	15 43 12.63	2.2204	14 37 55.3	6.406
20	15 45 25.83	2.2196	14 44 17.0	6.319
21	15 47 38.98	2.2187	14 50 33.5	6.231
22	15 49 52.07	2.2178	14 56 44.7	6.142
23	15 52 5.11	2.2169	S. 15 2 50.6	6.053

WEDNESDAY 24.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
0	15 54 18.10	2.2160	S. 15 8 51.1	5.964
1	15 56 31.03	2.2151	15 14 46.3	5.875
2	15 58 43.91	2.2142	15 20 36.1	5.786
3	16 0 56.74	2.2133	15 26 20.6	5.697
4	16 3 9.51	2.2123	15 31 59.7	5.607
5	16 5 22.22	2.2114	15 37 33.4	5.517
6	16 7 34.88	2.2105	15 43 1.7	5.426
7	16 9 47.48	2.2095	15 48 24.5	5.335
8	16 12 0.02	2.2086	15 53 41.9	5.245
9	16 14 12.51	2.2077	15 58 53.9	5.154
10	16 16 24.94	2.2067	16 4 0.4	5.063
11	16 18 37.31	2.2056	16 9 1.4	4.972
12	16 20 49.61	2.2045	16 13 57.0	4.881
13	16 23 1.85	2.2036	16 18 47.1	4.789
14	16 25 14.04	2.2026	16 23 31.6	4.696
15	16 27 26.16	2.2015	16 28 10.6	4.604
16	16 29 38.22	2.2004	16 32 44.1	4.512
17	16 31 50.21	2.1993	16 37 12.1	4.420
18	16 34 2.14	2.1982	16 41 34.5	4.327
19	16 36 14.00	2.1972	16 45 51.4	4.235
20	16 38 25.80	2.1961	16 50 2.7	4.142
21	16 40 37.53	2.1949	16 54 8.5	4.050
22	16 42 49.19	2.1938	16 58 8.7	3.957
23	16 45 0.78	2.1927	17 2 3.4	3.865
24	16 47 12.31	2.1916	S. 17 5 52.5	3.772

GREENWICH MEAN TIME.

THE MOON'S RIGHT ASCENSION AND DECLINATION.

THURSDAY 25.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
	h m s	s	° ′ ″	″
0	16 47 12.31	2.1916	S. 17 5 52.5	3.772
1	16 49 23.77	2.1904	17 9 36.0	3.679
2	16 51 35.16	2.1892	17 13 14.0	3.587
3	16 53 46.47	2.1879	17 16 46.4	3.493
4	16 55 57.71	2.1867	17 20 13.2	3.400
5	16 58 8.88	2.1855	17 23 34.4	3.307
6	17 0 19.97	2.1842	17 26 50.1	3.215
7	17 2 30.99	2.1830	17 30 0.2	3.122
8	17 4 41.93	2.1817	17 33 4.7	3.028
9	17 6 52.80	2.1805	17 36 3.6	2.935
10	17 9 3.59	2.1792	17 38 56.9	2.842
11	17 11 14.30	2.1779	17 41 44.6	2.749
12	17 13 24.94	2.1766	17 44 26.8	2.657
13	17 15 35.50	2.1752	17 47 3.4	2.564
14	17 17 45.97	2.1738	17 49 34.4	2.471
15	17 19 56.36	2.1725	17 51 59.9	2.378
16	17 22 6.67	2.1711	17 54 19.8	2.286
17	17 24 16.89	2.1697	17 56 34.2	2.193
18	17 26 27.03	2.1682	17 58 43.0	2.100
19	17 28 37.08	2.1668	18 0 46.2	2.008
20	17 30 47.05	2.1654	18 2 43.9	1.916
21	17 32 56.93	2.1639	18 4 36.1	1.823
22	17 35 6.72	2.1625	18 6 22.7	1.731
23	17 37 16.43	2.1611	S. 18 8 3.8	1.639

FRIDAY 26.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
0	17 39 26.05	2.1596	S. 18 9 39.4	1.547
1	17 41 35.58	2.1581	18 11 9.5	1.456
2	17 43 45.02	2.1565	18 12 34.1	1.364
3	17 45 54.36	2.1549	18 13 53.1	1.272
4	17 48 3.61	2.1534	18 15 6.7	1.181
5	17 50 12.77	2.1518	18 16 14.8	1.089
6	17 52 21.83	2.1502	18 17 17.4	0.998
7	17 54 30.80	2.1487	18 18 14.6	0.907
8	17 56 39.67	2.1471	18 19 6.3	0.816
9	17 58 48.45	2.1455	18 19 52.5	0.725
10	18 0 57.13	2.1438	18 20 33.3	0.635
11	18 3 5.71	2.1422	18 21 8.7	0.545
12	18 5 14.20	2.1406	18 21 38.7	0.455
13	18 7 22.59	2.1389	18 22 3.3	0.365
14	18 9 30.87	2.1372	18 22 22.5	0.275
15	18 11 39.05	2.1355	18 22 36.3	0.186
16	18 13 47.13	2.1338	18 22 44.8	0.097
17	18 15 55.11	2.1322	18 22 47.9	– 0.007
18	18 18 2.99	2.1304	18 22 45.6	+ 0.082
19	18 20 10.76	2.1287	18 22 38.0	0.171
20	18 22 18.43	2.1269	18 22 25.1	0.259
21	18 24 25.99	2.1252	18 22 6.9	0.347
22	18 26 33.45	2.1234	18 21 43.4	0.435
23	18 28 40.80	2.1217	18 21 14.7	0.523
24	18 30 48.05	2.1199	S. 18 20 40.7	0.611

SATURDAY 27.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
	h m s	s	° ′ ″	″
0	18 30 48.05	2.1199	S. 18 20 40.7	0.611
1	18 32 55.19	2.1181	18 20 1.4	0.698
2	18 35 2.22	2.1162	18 19 16.9	0.785
3	18 37 9.14	2.1144	18 18 27.2	0.872
4	18 39 15.95	2.1126	18 17 32.3	0.958
5	18 41 22.65	2.1108	18 16 32.2	1.044
6	18 43 29.25	2.1091	18 15 27.0	1.130
7	18 45 35.74	2.1072	18 14 16.6	1.216
8	18 47 42.11	2.1053	18 13 1.1	1.302
9	18 49 48.37	2.1034	18 11 40.4	1.387
10	18 51 54.52	2.1016	18 10 14.6	1.472
11	18 54 0.56	2.0997	18 8 43.7	1 557
12	18 56 6.49	2.0978	18 7 7.8	1.641
13	18 58 12.30	2.0959	18 5 26.8	1.725
14	19 0 18.00	2.0941	18 3 40.8	1.809
15	19 2 23.59	2.0922	18 1 49.7	1.892
16	19 4 29.07	2.0903	17 59 53.7	1.975
17	19 6 34.43	2.0884	17 57 52.7	2.058
18	19 8 39.68	2.0865	17 55 46.7	2.141
19	19 10 44.81	2.0846	17 53 35.8	2.223
20	19 12 49.83	2.0827	17 51 20.0	2.305
21	19 14 54.74	2.0808	17 48 59.2	2.387
22	19 16 59.53	2.0789	17 46 33.5	2.468
23	19 19 4.21	2.0770	S. 17 44 3.0	2.548

SUNDAY 28.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
0	19 21 8.77	2.0750	S. 17 41 27.7	2.628
1	19 23 13.21	2.0731	17 38 47.6	2.709
2	19 25 17.54	2.0712	17 36 2.6	2.790
3	19 27 21.76	2.0693	17 33 12.8	2.870
4	19 29 25.86	2.0674	17 30 18.2	2.949
5	19 31 29.85	2.0655	17 27 18.9	3.027
6	19 33 33.72	2.0636	17 24 14.9	3.106
7	19 35 37.48	2.0617	17 21 6.2	3.184
8	19 37 41.12	2.0597	17 17 52.8	3.262
9	19 39 44.64	2.0577	17 14 34.7	3.340
10	19 41 48.05	2.0558	17 11 12.0	3.417
11	19 43 51.34	2.0539	17 7 44.7	3.494
12	19 45 54.52	2.0521	17 4 12.7	3.571
13	19 47 57.59	2.0502	17 0 36.1	3.647
14	19 50 0.54	2.0482	16 56 55.0	3.722
15	19 52 3.38	2.0463	16 53 9.4	3.797
16	19 54 6.10	2.0444	16 49 19.3	3.872
17	19 56 8.71	2.0426	16 45 24.7	3.947
18	19 58 11.21	2.0407	16 41 25.6	4.022
19	20 0 13.59	2.0388	16 37 22.1	4.095
20	20 2 15.86	2.0369	16 33 14.1	4.170
21	20 4 18.02	2.0351	16 29 1.7	4.243
22	20 6 20.07	2.0332	16 24 44.9	4.316
23	20 8 22.01	2.0313	16 20 23.8	4.389
24	20 10 23.83	2.0295	S. 16 15 58.3	4.461

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Name and Direction of Object.		Noon.	P. L. of Diff.	IIIh.	P. L. of Diff.	VIh.	P. L. of Diff.	IXh.
14	Mars	E.	67° 10′ 58″	2217	65° 22′ 56″	2205	63° 34′ 36″	2194	61° 45′ 59″
	Jupiter	E.	86 3 48	2279	84 17 17	2266	82 30 28	2254	80 43 21
15	Sun	W.	115 26 19	2532	117 6 48	2520	118 47 34	2508	120 28 36
	α Arietis	W.	75 22 31	2360	77 7 3	2346	78 51 55	2334	80 37 5
	Aldebaran	W.	42 1 18	2221	43 49 14	2210	45 37 27	2199	47 25 56
	Regulus	E.	38 9 31	2229	36 21 47	2218	34 33 47	2208	32 45 32
	Mars	E.	52 38 49	2130	50 48 36	2120	48 58 8	2111	47 7 26
	Jupiter	E.	71 43 16	2183	69 54 23	2172	68 5 13	2161	66 15 47
	Spica	E.	91 43 37	2239	89 56 7	2228	88 8 21	2216	86 20 18
16	Aldebaran	W.	56 32 13	2140	58 22 11	2132	60 12 22	2123	62 2 46
	Saturn	W.	33 22 46	2189	35 11 30	2176	37 0 33	2165	38 49 53
	Mars	E.	37 50 48	2067	35 58 58	2061	34 6 59	2057	32 14 54
	Jupiter	E.	57 4 43	2103	55 13 48	2094	53 22 39	2086	51 31 18
	Spica	E.	77 16 16	2159	75 26 46	2150	73 37 3	2142	71 47 8
17	Aldebaran	W.	71 17 27	2085	73 8 50	2080	75 0 20	2075	76 51 57
	Saturn	W.	48 0 0	2116	49 50 35	2109	51 41 20	2104	53 32 13
	Pollux	W.	29 21 23	2421	31 4 28	2381	32 48 30	2348	34 33 20
	Jupiter	E.	42 11 50	2047	40 19 29	2042	38 27 1	2039	36 34 27
	Spica	E.	62 35 6	2107	60 44 18	2103	58 53 24	2100	57 2 25
18	Aldebaran	W.	86 11 2	2064	88 2 57	2064	89 54 52	2065	91 46 45
	Saturn	W.	62 47 55	2088	64 39 12	2088	66 30 29	2089	68 21 45
	Pollux	W.	43 25 53	2231	45 13 34	2221	47 1 30	2213	48 49 38
	Spica	E.	47 46 56	2097	45 55 52	2099	44 4 52	2103	42 13 57
	Antares	E.	93 36 37	2128	91 46 20	2128	89 56 4	2129	88 5 49
19	Saturn	W.	77 37 17	2107	79 28 6	2113	81 18 46	2118	83 9 17
	Pollux	W.	57 52 5	2194	59 40 41	2196	61 29 15	2198	63 17 45
	Spica	E.	33 1 36	2147	31 11 48	2159	29 22 19	2174	27 33 13
	Antares	E.	78 55 34	2151	77 5 52	2157	75 16 20	2165	73 26 59
20	Pollux	W.	72 18 26	2233	74 6 4	2243	75 53 28	2252	77 40 38
	Regulus	W.	35 46 51	2155	37 36 27	2164	39 25 49	2174	41 14 55
	Mars	W.	23 26 48	2120	25 17 17	2121	27 7 44	2124	28 58 6
	Antares	E.	64 23 44	2226	62 35 55	2239	60 48 25	2253	59 1 16
21	Pollux	W.	86 32 17	2325	88 17 40	2339	90 2 43	2354	91 47 24
	Regulus	W.	50 15 58	2249	52 3 12	2264	53 50 5	2278	55 36 37
	Mars	W.	38 7 5	2177	39 56 7	2190	41 44 50	2202	43 33 14
	Jupiter	W.	17 23 33	2206	19 11 52	2220	20 59 49	2235	22 47 24
	Antares	E.	50 11 29	2357	48 26 52	2378	46 42 45	2399	44 59 9
22	Regulus	W.	64 23 33	2373	66 7 46	2391	67 51 34	2408	69 34 57
	Mars	W.	52 29 55	2291	54 16 7	2307	56 1 56	2324	57 47 20
	Jupiter	W.	31 39 37	2330	33 24 53	2347	35 9 44	2364	36 54 10
	Antares	E.	36 30 5	2563	34 50 19	2597	33 11 20	2635	31 33 12
	Venus	E.	111 24 1	2505	109 42 55	2524	108 2 15	2543	106 22 1
23	Regulus	W.	78 5 42	2514	79 46 36	2532	81 27 5	2550	83 7 9

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day	Name and Direction of Object.		Midnight.	P. L. of Diff.	XV^h.	P. L. of Diff.	XVIII^h.	P. L. of Diff.	XXI^h.	P. L. of Diff.
4	MARS	E.	59° 57′ 6″	2172	58° 7′ 56″	2161	56° 18′ 29″	2151	54° 28′ 47″	2140
	JUPITER	E.	78 55 55	2230	77 8 12	2218	75 20 11	2206	73 31 52	2194
5	SUN	W.	122 9 54	2485	123 51 28	2475	125 33 17	2465	127 15 20	2455
	α Arietis	W.	82 22 32	2311	84 8 16	2300	85 54 16	2289	87 40 31	2279
	Aldebaran	W.	49 14 41	2178	51 3 42	2168	52 52 58	2158	54 42 29	2149
	Regulus	E.	30 57 2	2189	29 8 18	2180	27 19 21	2173	25 30 13	2166
	MARS	E.	45 16 30	2094	43 25 21	2086	41 34 0	2079	39 42 29	2073
	JUPITER	E.	64 26 4	2140	62 36 6	2130	60 45 53	2120	58 55 25	2111
	Spica	E.	84 31 59	2196	82 43 25	2186	80 54 36	2176	79 5 33	2167
6	Aldebaran	W.	63 53 21	2108	65 44 8	2101	67 35 5	2095	69 26 12	2090
	SATURN	W.	40 39 28	2146	42 29 17	2137	44 19 20	2129	46 9 35	2122
	MARS	E.	30 22 45	2053	28 30 34	2053	26 38 23	2055	24 46 15	2060
	JUPITER	E.	49 39 45	2071	47 48 1	2064	45 56 7	2058	44 4 3	2052
	Spica	E.	69 57 3	2128	68 6 47	2122	66 16 22	2116	64 25 48	2111
7	Aldebaran	W.	78 43 39	2070	80 35 25	2067	82 27 15	2065	84 19 8	2064
	SATURN	W.	55 23 12	2096	57 14 17	2094	59 5 26	2091	60 56 39	2089
	Pollux	W.	36 18 50	2296	38 4 55	2276	39 51 30	2258	41 38 31	2244
	JUPITER	E.	34 41 47	2032	32 49 3	2030	30 56 16	2028	29 3 26	2027
	Spica	E.	55 11 22	2096	53 20 16	2095	51 29 9	2095	49 38 2	2096
8	Aldebaran	W.	93 38 36	2068	95 30 24	2072	97 22 7	2075	99 13 44	2080
	SATURN	W.	70 13 0	2092	72 4 12	2095	73 55 19	2098	75 46 21	2102
	Pollux	W.	50 37 56	2201	52 26 22	2197	54 14 54	2195	56 3 29	2194
	Spica	E.	40 23 9	2113	38 32 29	2119	36 41 59	2127	34 51 41	2136
	Antares	E.	86 15 36	2133	84 25 27	2136	82 35 23	2140	80 45 25	2145
9	SATURN	W.	84 59 38	2132	86 49 48	2141	88 39 45	2149	90 29 29	2159
	Pollux	W.	65 6 9	2207	66 54 26	2212	68 42 35	2218	70 30 36	2225
	Spica	E.	25 44 33	2211	23 56 22	2235	22 8 46	2264	20 21 54	2300
	Antares	E.	71 37 51	2182	69 48 56	2191	68 0 15	[illegible]	66 11 51	2214
10	Pollux	W.	79 27 33	2274	81 14 11	2285	83 0 32	2296	84 46 34	2311
	Regulus	W.	43 3 44	2197	44 52 16	2210	46 40 29	2223	48 28 23	2235
	MARS	W.	30 48 20	2137	32 38 22	2146	34 28 11	2155	36 17 46	2166
	Antares	E.	57 14 30	2284	55 28 7	2300	53 42 8	2318	51 56 35	2337
11	Pollux	W.	93 31 43	2385	95 15 39	2402	96 59 11	2419	98 42 19	2436
	Regulus	W.	57 22 46	2309	59 8 32	2324	60 53 56	2341	62 38 56	2357
	MARS	W.	45 21 17	2331	47 8 59	2345	48 56 20	2360	50 43 19	2375
	JUPITER	W.	24 34 37	2266	26 21 27	2281	28 7 54	2296	29 53 57	2313
	Antares	E.	43 16 6	2447	41 33 38	2473	39 51 47	2501	38 10 35	2531
12	Regulus	W.	71 17 56	2443	73 0 30	2460	74 42 39	2478	76 24 23	2496
	MARS	W.	59 32 20	2358	61 16 55	2375	63 1 6	2392	64 44 52	2410
	JUPITER	W.	38 38 11	2399	40 21 47	2417	42 4 58	2434	43 47 44	2452
	Antares	E.	29 56 0	2791	28 19 48	2772	26 44 43	[illegible]	25 10 53	[illegible]
	VENUS	E.	104 42 13	2580	103 2 51	2599	101 23 55	2619	99 45 26	2638
13	Regulus	W.	84 46 49	2585	86 26 4	2604	88 4 54	2621	89 43 20	2638

GREENWICH MEAN TIME.

LUNAR

Day of the Month	Name and Direction of Object.		Midnight.	P. L. of Diff.
23	Mars	W.	73 17 27	2400
	Jupiter	W.	52 15 20	2540
	Spica	W.	31 31 44	2644
	α Aquilæ	E.	67 42 39	3117
	Venus	E.	91 39 34	2736
24	Regulus	W.	97 49 39	2725
	Mars	W.	86 36 49	2657
	Jupiter	W.	65 26 23	2678
	Spica	W.	14 26 30	2557
	α Aquilæ	E.	56 19 6	3409
	Venus	E.	79 4 27	2949
	Sun	E.	117 59 46	3070
25	Jupiter	W.	78 13 43	2801
	Spica	W.	57 0 58	2870
	Venus	E.	66 54 30	3087
	Fomalhaut	E.	76 39 5	3907
	Sun	E.	106 19 34	3306
26	Jupiter	W.	90 41 14	2961
	Spica	W.	69 17 1	2967
	Venus	E.	55 5 54	3149
	Fomalhaut	E.	65 15 45	3369
	α Pegasi	E.	79 30 19	3325
	Sun	E.	94 59 11	3316
27	Spica	W.	81 18 37	3039
	Antares	W.	36 20 37	3380
	Venus	E.	43 33 56	3230
	Fomalhaut	E.	54 24 59	3545
	α Pegasi	E.	68 12 38	3336
	Sun	E.	83 53 55	3397
28	Spica	W.	93 10 24	3069
	Antares	W.	47 51 38	3176
	Venus	E.	32 13 41	3308
	Fomalhaut	E.	44 7 22	3650
	α Pegasi	E.	57 12 32	3450
	Sun	E.	72 58 45	3445
29	Antares	W.	59 25 11	3163
	α Pegasi	E.	46 33 6	3595
	Sun	E.	62 8 41	3461
30	Antares	W.	71 2 3	3135
	α Pegasi	E.	36 25 49	3857
	Sun	E.	51 19 6	3448
31	Antares	W.	82 44 20	3083
	α Aquilæ	W.	40 20 19	4254
	Sun	E.	40 26 1	3419

AT GREENWICH MEAN NOON.

Day of the Week.	Day of the Month.	THE SUN'S Apparent Right Ascension.	Diff. for 1 Hour.	Apparent Declination	Diff. for 1 Hour.	Equation of Time, to be Subtracted from / Added to Mean Time.	Diff. for 1 Hour.	Sidereal Time, or Right Ascension of Mean Sun
		h m s	s	° ′ ″	″	m s	s	h m s
Thur.	1	0 42 58.14	9.105	N 4 37 21.7	+57.82	3 53.65	0.751	0 39 4.49
Frid.	2	0 46 36.71	9.110	5 0 26.9	57.61	3 35.67	0.746	0 43 1.04
Sat.	3	0 50 15.41	9.116	5 23 26.8	57.38	3 17.82	0.740	0 46 57.59
SUN.	4	0 53 54.26	9.123	5 46 21.0	+57.13	3 0.12	0.733	0 50 54.14
Mon.	5	0 57 33.29	9.130	6 9 9.2	56.87	2 42.59	0.726	0 54 50.70
Tues.	6	1 1 12.50	9.138	6 31 51.0	56.60	2 25.25	0.718	0 58 47.25
Wed.	7	1 4 51.90	9.146	6 54 26.1	+56.31	2 8.10	0.710	1 2 43.80
Thur.	8	1 8 31.51	9.155	7 16 54.1	56.01	1 51.16	0.701	1 6 40.35
Frid.	9	1 12 11.35	9.165	7 39 14.7	55.69	1 34.44	0.691	1 10 36.91
Sat.	10	1 15 51.42	9.175	8 1 27.5	+55.36	1 17.96	0.681	1 14 33.46
SUN.	11	1 19 31.76	9.186	8 23 32.1	55.01	1 1.75	0.670	1 18 30.01
Mon.	12	1 23 12.37	9.198	8 45 28.3	54.66	0 45.84	0.658	1 22 26.56
Tues.	13	1 26 53.26	9.211	9 7 15.6	+54.29	0 30.14	0.645	1 26 23.12
Wed.	14	1 30 34.46	9.224	9 28 53.8	53.90	0 14.79	0.632	1 30 19.67
Thur.	15	1 34 15.99	9.238	9 50 22.5	53.49	0 0.23	0.618	1 34 16.22
Frid.	16	1 37 57.86	9.252	10 11 41.4	+53.08	0 14.91	0.604	1 38 12.77
Sat.	17	1 41 40.10	9.268	10 32 50.1	52.64	0 29.23	0.588	1 42 9.33
SUN.	18	1 45 22.72	9.284	10 53 48.4	52.20	0 43.16	0.572	1 46 5.88
Mon.	19	1 49 5.74	9.301	11 14 35.9	+51.74	0 56.70	0.555	1 50 2.44
Tues.	20	1 52 49.17	9.319	11 35 12.4	51.28	1 9.82	0.537	1 53 58.99
Wed.	21	1 56 33.04	9.337	11 55 37.5	50.80	1 22.50	0.519	1 57 55.54
Thur.	22	2 0 17.36	9.356	12 15 50.9	+50.31	1 34.73	0.500	2 1 52.09
Frid.	23	2 4 2.14	9.376	12 35 52.3	49.80	1 46.51	0.480	2 5 48.65
Sat.	24	2 7 47.39	9.397	12 55 41.3	49.28	1 57.81	0.459	2 9 45.20
SUN.	25	2 11 33.14	9.418	13 15 17.6	+48.75	2 8.61	0.438	2 13 41.75
Mon.	26	2 15 19.41	9.439	13 34 40.9	48.20	2 18.89	0.417	2 17 38.30
Tues.	27	2 19 6.19	9.460	13 53 51.0	47.64	2 28.67	0.396	2 21 34.86
Wed.	28	2 22 53.49	9.482	14 12 47.5	+47.06	2 37.93	0.374	2 25 31.41
Thur.	29	2 26 41.32	9.504	14 31 30.0	46.47	2 46.65	0.352	2 29 27.97
Frid.	30	2 30 29.69	9.527	14 49 58.2	45.87	2 54.83	0.329	2 33 24.52
Sat.	31	2 34 18.60	9.549	N. 15 8 11.9	+45.26	3 2.48	0.307	2 37 21.08

NOTE.—The semidiameter for mean noon may be assumed the same as that for apparent noon. The sign + prefixed to the hourly change of declination indicates that north declinations are increasing.

Diff. for 1 Hour, + 9s.8565. (Table III.)

GREENWICH MEAN TIME.

THE MOON'S

Day of the Month.	UPPER TRANSIT. Meridian of Greenwich	UPPER TRANSIT. Diff. for 1 Hour.	AGE. Noon.
	h m	m	d
1	22 33.6	1.83	26.6
2	23 17.6	1.85	27.6
3	☌		28.6
4	0 2.3	1.89	29.6
5	0 48.4	1.95	0.9
6	1 36.2	2.04	1.9
7	2 26.1	2.13	2.9
8	3 18.5	2.23	3.9
9	4 13.0	2.31	4.9
10	5 9.0	2.36	5.9
11	6 5.8	2.36	6.9
12	7 2.5	2.35	7.9
13	7 58.4	2.31	8.9
14	8 53.2	2.26	9.9
15	9 46.9	2.21	10.9
16	10 39.7	2.18	11.9
17	11 31.9	2.17	12.9
18	12 24.0	2.17	13.9
19	13 16.0	2.17	14.9
20	14 8.0	2.16	15.9
21	14 59.6	2.13	16.9
22	15 50.4	2.09	17.9
23	16 40.1	2.04	18.9
24	17 28.3	1.98	19.9
25	18 15.0	1.91	20.9
26	19 0.3	1.86	21.9
27	19 44.6	1.83	22.9
28	20 28.3	1.82	23.9
29	21 12.0	1.83	24.9
30	21 56.4	1.87	25.9
31	22 42.1	1.94	26.9

GREENWICH MEAN TIME.

THE MOON'S RIGHT ASCENSION AND DECLINATION.

THURSDAY 1.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
	h m s	s	° ′ ″	″
0	22 32 37.63	1.9387	S. 8 14 27.0	8.526
1	22 34 33.94	1.9383	8 5 54.3	8.564
2	22 36 30.23	1.9379	7 57 19.3	8.602
3	22 38 26.49	1.9375	7 48 42.0	8.641
4	22 40 22.73	1.9373	7 40 2.4	8.679
5	22 42 18.96	1.9371	7 31 20.5	8.717
6	22 44 15.18	1.9368	7 22 36.4	8.753
7	22 46 11.38	1.9366	7 13 50.2	8.788
8	22 48 7.57	1.9364	7 5 1.9	8.823
9	22 50 3.74	1.9362	6 56 11.4	8.858
10	22 51 59.91	1.9361	6 47 18.9	8.893
11	22 53 56.07	1.9359	6 38 24.3	8.926
12	22 55 52.22	1.9358	6 29 27.7	8.959
13	22 57 48.37	1.9358	6 20 29.2	8.992
14	22 59 44.52	1.9359	6 11 28.7	9.024
15	23 1 40.68	1.9360	6 2 26.3	9.056
16	23 3 36.84	1.9360	5 53 22.0	9.087
17	23 5 33.00	1.9361	5 44 15.9	9.117
18	23 7 29.17	1.9362	5 35 8.0	9.147
19	23 9 25.35	1.9364	5 25 58.3	9.176
20	23 11 21.54	1.9366	5 16 46.9	9.204
21	23 13 17.74	1.9368	5 7 33.8	9.232
22	23 15 13.96	1.9371	4 58 19.1	9.259
23	23 17 10.19	1.9374	S. 4 49 2.7	9.286

FRIDAY 2.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
0	23 19 6.44	1.9377	S. 4 39 44.7	9.312
1	23 21 2.71	1.9381	4 30 25.2	9.337
2	23 22 59.01	1.9385	4 21 4.2	9.363
3	23 24 55.33	1.9389	4 11 41.6	9.388
4	23 26 51.68	1.9394	4 2 17.6	9.412
5	23 28 48.06	1.9399	3 52 52.2	9.435
6	23 30 44.47	1.9404	3 43 25.4	9.457
7	23 32 40.91	1.9410	3 33 57.3	9.479
8	23 34 37.39	1.9417	3 24 27.9	9.500
9	23 36 33.91	1.9423	3 14 57.3	9.521
10	23 38 30.47	1.9430	3 5 25.4	9.542
11	23 40 27.07	1.9437	2 55 52.3	9.561
12	23 42 23.71	1.9444	2 46 18.1	9.580
13	23 44 20.40	1.9452	2 36 42.7	9.598
14	23 46 17.14	1.9460	2 27 6.3	9.615
15	23 48 13.92	1.9468	2 17 28.9	9.632
16	23 50 10.76	1.9477	2 7 50.5	9.648
17	23 52 7.65	1.9487	1 58 11.1	9.664
18	23 54 4.60	1.9496	1 48 30.8	9.679
19	23 56 1.60	1.9506	1 38 49.6	9.693
20	23 57 58.67	1.9517	1 29 7.6	9.707
21	23 59 55.80	1.9527	1 19 24.8	9.720
22	0 1 52.99	1.9538	1 9 41.2	9.732
23	0 3 50.25	1.9549	0 59 56.9	9.744
24	0 5 47.58	1.9561	S. 0 50 11.9	9.755

SATURDAY 3.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
	h m s	s	° ′ ″	″
0	0 5 47.58	1.9561	S. 0 50 11.9	9.755
1	0 7 44.98	1.9573	0 40 26.3	9.765
2	0 9 42.45	1.9585	0 30 40.1	9.774
3	0 11 40.00	1.9598	0 20 53.4	9.783
4	0 13 37.63	1.9611	0 11 6.1	9.792
5	0 15 35.34	1.9624	S. 0 1 18.4	9.799
6	0 17 33.12	1.9638	N. 0 8 29.8	9.806
7	0 19 30.99	1.9652	0 18 18.4	9.812
8	0 21 28.95	1.9667	0 28 7.3	9.817
9	0 23 26.99	1.9681	0 37 56.5	9.822
10	0 25 25.12	1.9696	0 47 46.0	9.826
11	0 27 23.35	1.9712	0 57 35.7	9.829
12	0 29 21.67	1.9728	1 7 25.5	9.832
13	0 31 20.09	1.9745	1 17 15.5	9.834
14	0 33 18.61	1.9762	1 27 5.6	9.835
15	0 35 17.23	1.9778	1 36 55.7	9.835
16	0 37 15.95	1.9796	1 46 45.8	9.834
17	0 39 14.78	1.9813	1 56 35.8	9.833
18	0 41 13.71	1.9831	2 6 25.8	9.832
19	0 43 12.75	1.9850	2 16 15.6	9.829
20	0 45 11.91	1.9869	2 26 5.2	9.826
21	0 47 11.18	1.9888	2 35 54.7	9.822
22	0 49 10.57	1.9907	2 45 43.9	9.817
23	0 51 10.07	1.9927	N. 2 55 32.7	9.811

SUNDAY 4.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
0	0 53 9.69	1.9947	N. 3 5 21.2	9.805
1	0 55 9.43	1.9967	3 15 9.3	9.797
2	0 57 9.30	1.9988	3 24 56.9	9.789
3	0 59 9.29	2.0009	3 34 44.0	9.780
4	1 1 9.41	2.0031	3 44 30.5	9.771
5	1 3 9.66	2.0053	3 54 16.5	9.761
6	1 5 10.05	2.0076	4 4 1.8	9.749
7	1 7 10.57	2.0098	4 13 46.4	9.738
8	1 9 11.23	2.0121	4 23 30.3	9.726
9	1 11 12.02	2.0144	4 33 13.5	9.713
10	1 13 12.95	2.0167	4 42 55.8	9.698
11	1 15 14.02	2.0191	4 52 37.2	9.682
12	1 17 15.24	2.0216	5 2 17.6	9.665
13	1 19 16.61	2.0240	5 11 57.0	9.649
14	1 21 18.12	2.0264	5 21 35.4	9.632
15	1 23 19.78	2.0289	5 31 12.8	9.614
16	1 25 21.59	2.0315	5 40 49.1	9.595
17	1 27 23.56	2.0341	5 50 24.2	9.575
18	1 29 25.68	2.0367	5 59 58.1	9.554
19	1 31 27.96	2.0393	6 9 30.7	9.532
20	1 33 30.40	2.0420	6 19 2.0	9.510
21	1 35 33.00	2.0447	6 28 31.9	9.487
22	1 37 35.76	2.0474	6 38 0.4	9.462
23	1 39 38.69	2.0502	6 47 27.4	9.436
24	1 41 41.79	2.0530	N. 6 56 52.8	9.410

GREENWICH MEAN TIME.

THE MOON'S RIGHT ASCENSION AND DECLINATION.

FRIDAY 9.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
	h m s	s	° ′ ″	″
0	5 14 12.58	2.3741	N.17 49 28.6	2.877
1	5 16 35.11	2.3768	17 52 18.0	2.771
2	5 18 57.80	2.3795	17 55 1.1	2.665
3	5 21 20.65	2.3822	17 57 37.8	2.557
4	5 23 43.66	2.3847	18 0 8.0	2.449
5	5 26 6.81	2.3871	18 2 31.7	2.342
6	5 28 30.11	2.3895	18 4 49.0	2.233
7	5 30 53.55	2.3919	18 6 59.7	2.123
8	5 33 17.14	2.3943	18 9 3.8	2.014
9	5 35 40.87	2.3967	18 11 1.4	1.905
10	5 38 4.74	2.3989	18 12 52.4	1.794
11	5 40 28.74	2.4011	18 14 36.7	1.683
12	5 42 52.87	2.4032	18 16 14.4	1.572
13	5 45 17.13	2.4053	18 17 45.4	1.461
14	5 47 41.51	2.4074	18 19 9.7	1.348
15	5 50 6.02	2.4095	18 20 27.2	1.235
16	5 52 30.65	2.4114	18 21 37.9	1.122
17	5 54 55.39	2.4132	18 22 41.9	1.010
18	5 57 20.24	2.4151	18 23 39.1	0.897
19	5 59 45.20	2.4169	18 24 29.5	0.783
20	6 2 10.27	2.4187	18 25 13.0	0.668
21	6 4 35.45	2.4205	18 25 49.6	0.553
22	6 7 0.73	2.4221	18 26 19.3	0.438
23	6 9 26.10	2.4236	N.18 26 42.2	0.324

SATURDAY 10.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
0	6 11 51.56	2.4251	N.18 26 58.2	0.209
1	6 14 17.11	2.4266	18 27 7.3	+ 0.093
2	6 16 42.75	2.4281	18 27 9.4	− 0.022
3	6 19 8.48	2.4294	18 27 4.6	0.138
4	6 21 34.28	2.4307	18 26 52.8	0.255
5	6 24 0.16	2.4320	18 26 34.0	0.371
6	6 26 26.12	2.4332	18 26 8.3	0.487
7	6 28 52.15	2.4343	18 25 35.6	0.603
8	6 31 18.24	2.4353	18 24 55.9	0.720
9	6 33 44.39	2.4363	18 24 9.2	0.837
10	6 36 10.60	2.4373	18 23 15.5	0.954
11	6 38 36.87	2.4382	18 22 14.7	1.071
12	6 41 3.19	2.4391	18 21 7.0	1.187
13	6 43 29.56	2.4399	18 19 52.3	1.304
14	6 45 55.98	2.4407	18 18 30.5	1.422
15	6 48 22.44	2.4413	18 17 1.7	1.539
16	6 50 48.94	2.4420	18 15 25.9	1.656
17	6 53 15.48	2.4426	18 13 43.0	1.773
18	6 55 42.05	2.4431	18 11 53.1	1.890
19	6 58 8.65	2.4435	18 9 56.2	2.007
20	7 0 35.27	2.4439	18 7 52.3	2.123
21	7 3 1.92	2.4443	18 5 41.4	2.240
22	7 5 28.59	2.4446	18 3 23.5	2.357
23	7 7 55.27	2.4448	18 0 58.6	2.473
24	7 10 21.97	2.4451	N.17 58 26.7	2.590

SUNDAY 11.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
	h m s	s	° ′ ″	″
0	7 10 21.97	2.4451	N.17 58 26.7	2.590
1	7 12 48.68	2.4452	17 55 47.8	2.706
2	7 15 15.39	2.4452	17 53 2.0	2.822
3	7 17 42.10	2.4452	17 50 9.2	2.937
4	7 20 8.81	2.4452	17 47 9.5	3.053
5	7 22 35.52	2.4451	17 44 2.9	3.169
6	7 25 2.22	2.4449	17 40 49.3	3.284
7	7 27 28.91	2.4447	17 37 28.8	3.398
8	7 29 55.59	2.4445	17 34 1.5	3.513
9	7 32 22.25	2.4442	17 30 27.3	3.628
10	7 34 48.89	2.4438	17 26 46.2	3.742
11	7 37 15.51	2.4435	17 22 58.3	3.855
12	7 39 42.11	2.4431	17 19 3.6	3.968
13	7 42 8.68	2.4426	17 15 2.1	4.081
14	7 44 35.22	2.4420	17 10 53.9	4.193
15	7 47 1.72	2.4414	17 6 38.9	4.306
16	7 49 28.19	2.4408	17 2 17.2	4.417
17	7 51 54.62	2.4401	16 57 48.8	4.529
18	7 54 21.00	2.4393	16 53 13.7	4.640
19	7 56 47.34	2.4386	16 48 32.0	4.750
20	7 59 13.63	2.4378	16 43 43.7	4.860
21	8 1 39.87	2.4369	16 38 48.8	4.969
22	8 4 6.06	2.4360	16 33 47.4	5.078
23	8 6 32.19	2.4351	N.16 28 39.4	5.187

MONDAY 12.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
0	8 8 58.27	2.4342	N.16 23 24.9	5.295
1	8 11 24.29	2.4331	16 18 4.0	5.402
2	8 13 50.24	2.4320	16 12 36.7	5.509
3	8 16 16.13	2.4309	16 7 2.9	5.616
4	8 18 41.95	2.4297	16 1 22.8	5.721
5	8 21 7.70	2.4286	15 55 36.4	5.826
6	8 23 33.38	2.4274	15 49 43.7	5.931
7	8 25 58.99	2.4262	15 43 44.7	6.034
8	8 28 24.52	2.4249	15 37 39.6	6.137
9	8 30 49.97	2.4236	15 31 28.3	6.239
10	8 33 15.35	2.4223	15 25 10.9	6.341
11	8 35 40.65	2.4209	15 18 47.4	6.442
12	8 38 5.86	2.4195	15 12 17.8	6.543
13	8 40 30.99	2.4181	15 5 42.2	6.642
14	8 42 56.03	2.4166	14 59 0.7	6.741
15	8 45 20.98	2.4151	14 52 13.3	6.839
16	8 47 45.84	2.4136	14 45 20.0	6.937
17	8 50 10.61	2.4121	14 38 20.9	7.033
18	8 52 35.29	2.4106	14 31 16.0	7.129
19	8 54 59.88	2.4090	14 24 5.4	7.224
20	8 57 24.37	2.4073	14 16 49.1	7.319
21	8 59 48.76	2.4057	14 9 27.1	7.412
22	9 2 13.05	2.4040	14 1 59.6	7.504
23	9 4 37.24	2.4024	13 54 26.6	7.596
24	9 7 1.34	2.4007	N.13 46 48.1	7.687

GREENWICH MEAN TIME.

THE MOON'S RIGHT ASCENSION AND DECLINATION.

SATURDAY 17.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
	h m s	s	° ′ ″	″
0	12 49 53.73	2.2649	S. 2 48 38.4	11.207
1	12 52 9.61	2.2645	2 59 50.2	11.185
2	12 54 25.47	2.2641	3 11 0.6	11.161
3	12 56 41.30	2.2636	3 22 9.5	11.136
4	12 58 57.10	2.2631	3 33 16.9	11.110
5	13 1 12.87	2.2627	3 44 22.7	11.082
6	13 3 28.62	2.2623	3 55 26.7	11.053
7	13 5 44.35	2.2619	4 6 29.0	11.023
8	13 8 0.05	2.2615	4 17 29.5	10.992
9	13 10 15.73	2.2612	4 28 28.1	10.960
10	13 12 31.39	2.2609	4 39 24.7	10.927
11	13 14 47.04	2.2606	4 50 19.3	10.892
12	13 17 2.67	2.2603	5 1 11.8	10.857
13	13 19 18.28	2.2601	5 12 2.1	10.820
14	13 21 33.88	2.2598	5 22 50.2	10.782
15	13 23 49.46	2.2595	5 33 35.9	10.743
16	13 26 5.02	2.2592	5 44 19.3	10.703
17	13 28 20.57	2.2591	5 55 0.3	10.661
18	13 30 36.11	2.2589	6 5 38.7	10.618
19	13 32 51.64	2.2587	6 16 14.5	10.575
20	13 35 7.16	2.2585	6 26 47.7	10.532
21	13 37 22.66	2.2583	6 37 18.3	10.487
22	13 39 38.15	2.2582	6 47 46.1	10.439
23	13 41 53.64	2.2581	S. 6 58 11.0	10.391

SUNDAY 18.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
0	13 44 9.12	2.2579	S. 7 8 33.0	10.342
1	13 46 24.59	2.2578	7 18 52.1	10.293
2	13 48 40.06	2.2577	7 29 8.2	10.242
3	13 50 55.52	2.2577	7 39 21.2	10.191
4	13 53 10.98	2.2576	7 49 31.1	10.138
5	13 55 26.43	2.2575	7 59 37.8	10.084
6	13 57 41.88	2.2574	8 9 41.2	10.029
7	13 59 57.32	2.2573	8 19 41.3	9.973
8	14 2 12.76	2.2573	8 29 38.0	9.917
9	14 4 28.20	2.2572	8 39 31.4	9.861
10	14 6 43.63	2.2572	8 49 21.3	9.802
11	14 8 59.06	2.2572	8 59 7.6	9.742
12	14 11 14.49	2.2572	9 8 50.3	9.681
13	14 13 29.92	2.2572	9 18 29.3	9.620
14	14 15 45.35	2.2571	9 28 4.7	9.558
15	14 18 0.77	2.2571	9 37 36.3	9.495
16	14 20 16.20	2.2571	9 47 4.1	9.431
17	14 22 31.62	2.2570	9 56 28.0	9.365
18	14 24 47.04	2.2570	10 5 47.9	9.299
19	14 27 2.46	2.2570	10 15 3.9	9.232
20	14 29 17.88	2.2570	10 24 15.8	9.165
21	14 31 33.30	2.2570	10 33 23.7	9.097
22	14 33 48.72	2.2570	10 42 27.5	9.028
23	14 36 4.14	2.2569	10 51 27.1	8.958
24	14 38 19.55	2.2569	S. 11 0 22.4	8.887

MONDAY 19.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
	h m s	s	° ′ ″	″
0	14 38 19.55	2.2569	S. 11 0 22.4	8.887
1	14 40 34.97	2.2569	11 9 13.5	8.815
2	14 42 50.38	2.2568	11 18 0.2	8.743
3	14 45 5.79	2.2568	11 26 42.6	8.670
4	14 47 21.20	2.2568	11 35 20.6	8.596
5	14 49 36.61	2.2567	11 43 54.1	8.522
6	14 51 52.01	2.2567	11 52 23.2	8.447
7	14 54 7.41	2.2567	12 0 47.7	8.370
8	14 56 22.81	2.2566	12 9 7.6	8.293
9	14 58 38.20	2.2565	12 17 22.9	8.216
10	15 0 53.59	2.2564	12 25 33.5	8.138
11	15 3 8.97	2.2563	12 33 39.4	8.059
12	15 5 24.35	2.2562	12 41 40.6	7.980
13	15 7 39.72	2.2561	12 49 37.0	7.899
14	15 9 55.08	2.2560	12 57 28.5	7.818
15	15 12 10.44	2.2559	13 5 15.2	7.737
16	15 14 25.79	2.2558	13 12 57.0	7.655
17	15 16 41.13	2.2556	13 20 33.8	7.573
18	15 18 56.46	2.2554	13 28 5.7	7.490
19	15 21 11.78	2.2553	13 35 32.6	7.406
20	15 23 27.09	2.2551	13 42 54.4	7.321
21	15 25 42.39	2.2548	13 50 11.1	7.236
22	15 27 57.67	2.2546	13 57 22.7	7.151
23	15 30 12.94	2.2544	S. 14 4 29.2	7.066

TUESDAY 20.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
0	15 32 28.20	2.2542	S. 14 11 30.6	6.980
1	15 34 43.44	2.2539	14 18 26.8	6.892
2	15 36 58.66	2.2536	14 25 17.7	6.804
3	15 39 13.87	2.2533	14 32 3.3	6.716
4	15 41 29.06	2.2529	14 38 43.6	6.627
5	15 43 44.22	2.2525	14 45 18.6	6.539
6	15 45 59.36	2.2522	14 51 48.3	6.450
7	15 48 14.48	2.2518	14 58 12.6	6.360
8	15 50 29.58	2.2515	15 4 31.5	6.270
9	15 52 44.66	2.2511	15 10 45.0	6.179
10	15 54 59.71	2.2506	15 16 53.0	6.088
11	15 57 14.73	2.2501	15 22 55.6	5.997
12	15 59 29.72	2.2496	15 28 52.7	5.906
13	16 1 44.68	2.2491	15 34 44.3	5.814
14	16 3 59.61	2.2486	15 40 30.3	5.721
15	16 6 14.51	2.2481	15 46 10.8	5.628
16	16 8 29.38	2.2475	15 51 45.7	5.535
17	16 10 44.21	2.2468	15 57 15.0	5.442
18	16 12 59.00	2.2462	16 2 38.8	5.349
19	16 15 13.75	2.2456	16 7 56.9	5.255
20	16 17 28.47	2.2450	16 13 9.4	5.161
21	16 19 43.15	2.2443	16 18 16.2	5.066
22	16 21 57.78	2.2435	16 23 17.3	4.971
23	16 24 12.37	2.2427	16 28 12.7	4.877
24	16 26 26.91	2.2419	S. 16 33 2.5	4.782

GREENWICH MEAN TIME.

THE MOON'S RIGHT ASCENSION AND DECLINATION.

SUNDAY 25.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
	h m s	s	° ′ ″	″
0	19 54 26.06	2.0631	S. 16 58 16.8	3.918
1	19 56 29.77	2.0607	16 54 19.4	3.994
2	19 58 33.34	2.0583	16 50 17.5	4.070
3	20 0 36.77	2.0559	16 46 11.0	4.145
4	20 2 40.05	2.0535	16 42 0.1	4.219
5	20 4 43.19	2.0512	16 37 44.8	4.293
6	20 6 46.19	2.0488	16 33 25.0	4.367
7	20 8 49.05	2.0465	16 29 0.8	4.440
8	20 10 51.77	2.0442	16 24 32.2	4.512
9	20 12 54.35	2.0418	16 19 59.3	4.584
10	20 14 56.79	2.0395	16 15 22.1	4.656
11	20 16 59.09	2.0372	16 10 40.6	4.727
12	20 19 1.25	2.0349	16 5 54.8	4.798
13	20 21 3.27	2.0326	16 1 4.8	4.868
14	20 23 5.16	2.0303	15 56 10.6	4.938
15	20 25 6.91	2.0281	15 51 12.2	5.008
16	20 27 8.53	2.0258	15 46 9.6	5.077
17	20 29 10.01	2.0236	15 41 2.9	5.146
18	20 31 11.36	2.0214	15 35 52.1	5.214
19	20 33 12.58	2.0192	15 30 37.2	5.282
20	20 35 13.67	2.0170	15 25 18.3	5.349
21	20 37 14.62	2.0148	15 19 55.3	5.416
22	20 39 15.44	2.0127	15 14 28.4	5.482
23	20 41 16.14	2.0106	S. 15 8 57.5	5.548

MONDAY 26.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
0	20 43 16.71	2.0084	S. 15 3 22.6	5.614
1	20 45 17.15	2.0063	14 57 43.8	5.679
2	20 47 17.47	2.0042	14 52 1.1	5.743
3	20 49 17.66	2.0022	14 46 14.6	5.808
4	20 51 17.73	2.0002	14 40 24.2	5.871
5	20 53 17.68	1.9982	14 34 30.0	5.934
6	20 55 17.51	1.9962	14 28 32.1	5.997
7	20 57 17.22	1.9942	14 22 30.4	6.059
8	20 59 16.81	1.9922	14 16 25.0	6.122
9	21 1 16.28	1.9902	14 10 15.8	6.183
10	21 3 15.64	1.9883	14 4 3.0	6.244
11	21 5 14.88	1.9864	13 57 46.5	6.305
12	21 7 14.01	1.9846	13 51 26.4	6.365
13	21 9 13.03	1.9827	13 45 2.7	6.424
14	21 11 11.94	1.9809	13 38 35.5	6.483
15	21 13 10.74	1.9791	13 32 4.7	6.542
16	21 15 9.43	1.9773	13 25 30.4	6.600
17	21 17 8.02	1.9756	13 18 52.7	6.657
18	21 19 6.50	1.9738	13 12 11.5	6.715
19	21 21 4.88	1.9722	13 5 26.9	6.772
20	21 23 3.16	1.9705	12 58 38.9	6.829
21	21 25 1.34	1.9689	12 51 47.4	6.886
22	21 26 59.43	1.9673	12 44 52.6	6.941
23	21 28 57.42	1.9657	12 37 54.5	6.996
24	21 30 55.31	1.9641	S. 12 30 53.1	7.050

TUESDAY 27.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
	h m s	s	° ′ ″	″
0	21 30 55.31	1.9641	S. 12 30 53.1	7.050
1	21 32 53.11	1.9626	12 23 48.5	7.104
2	21 34 50.82	1.9611	12 16 40.6	7.158
3	21 36 48.44	1.9597	12 9 29.5	7.211
4	21 38 45.98	1.9582	12 2 15.2	7.264
5	21 40 43.43	1.9567	11 54 57.8	7.317
6	21 42 40.79	1.9553	11 47 37.2	7.368
7	21 44 38.07	1.9540	11 40 13.6	7.419
8	21 46 35.27	1.9527	11 32 46.9	7.471
9	21 48 32.39	1.9514	11 25 17.1	7.522
10	21 50 29.44	1.9502	11 17 44.3	7.571
11	21 52 26.41	1.9489	11 10 8.6	7.620
12	21 54 23.31	1.9477	11 2 29.9	7.670
13	21 56 20.14	1.9466	10 54 48.2	7.718
14	21 58 16.90	1.9454	10 47 3.7	7.766
15	22 0 13.59	1.9443	10 39 16.3	7.813
16	22 2 10.22	1.9433	10 31 26.1	7.861
17	22 4 6.79	1.9422	10 23 33.0	7.908
18	22 6 3.29	1.9412	10 15 37.1	7.954
19	22 7 59.74	1.9403	10 7 38.5	8.000
20	22 9 56.13	1.9393	9 59 37.1	8.046
21	22 11 52.46	1.9384	9 51 33.0	8.090
22	22 13 48.74	1.9376	9 43 26.3	8.134
23	22 15 44.97	1.9367	S. 9 35 16.9	8.178

WEDNESDAY 28.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
0	22 17 41.15	1.9359	S. 9 27 4.9	8.221
1	22 19 37.28	1.9352	9 18 50.3	8.264
2	22 21 33.37	1.9345	9 10 33.2	8.307
3	22 23 29.42	1.9338	9 2 13.5	8.349
4	22 25 25.43	1.9332	8 53 51.3	8.391
5	22 27 21.40	1.9326	8 45 26.6	8.432
6	22 29 17.34	1.9321	8 36 59.5	8.472
7	22 31 13.25	1.9315	8 28 30.0	8.512
8	22 33 9.12	1.9309	8 19 58.1	8.552
9	22 35 4.96	1.9305	8 11 23.8	8.591
10	22 37 0.78	1.9301	8 2 47.2	8.629
11	22 38 56.57	1.9297	7 54 8.3	8.667
12	22 40 52.34	1.9293	7 45 27.2	8.704
13	22 42 48.09	1.9291	7 36 43.8	8.741
14	22 44 43.83	1.9288	7 27 58.2	8.777
15	22 46 39.55	1.9285	7 19 10.5	8.813
16	22 48 35.25	1.9283	7 10 20.6	8.849
17	22 50 30.95	1.9282	7 1 28.6	8.885
18	22 52 26.64	1.9281	6 52 34.4	8.920
19	22 54 22.32	1.9280	6 43 38.2	8.954
20	22 56 18.00	1.9280	6 34 40.0	8.987
21	22 58 13.68	1.9280	6 25 39.8	9.020
22	23 0 9.36	1.9280	6 16 37.6	9.052
23	23 2 5.04	1.9281	6 7 33.5	9.084
24	23 4 0.73	1.9282	S. 5 58 27.5	9.116

GREENWICH MEAN TIME.

LUNAR

Day of the Month.	Name and Direction of Object.		Midnight.	P. L. of Diff.	XVh.	P. L. of Diff.	XVIIIh.	P. L. of Diff.	XXIh.	P. L. of Diff.
			° ′ ″		° ′ ″		° ′ ″		° ′ ″	
13	Saturn	W.	49 14 59	2264	51 1 51	2260	52 48 50	2255	54 35 56	2251
	Pollux	W.	31 46 48	2504	33 27 55	2475	35 9 43	2450	36 52 7	2427
	Jupiter	E.	36 11 30	2190	34 22 47	2185	32 33 58	2182	30 45 4	2179
	Spica	E.	59 57 52	2245	58 10 31	2249	56 23 6	2239	54 35 37	2237
14	Sun	W.	131 41 7	2517	133 21 56	2516	135 2 47	2516	136 43 38	2517
	Aldebaran	W.	88 21 58	2198	90 10 28	2199	91 58 59	2196	93 47 32	2196
	Saturn	W.	63 32 42	2236	65 20 16	2235	67 7 52	2234	68 55 29	2233
	Pollux	W.	45 30 53	2352	47 15 37	2342	49 0 36	2333	50 45 48	2325
	Spica	E.	45 37 40	2234	43 50 3	2235	42 2 28	2237	40 14 56	2239
	Antares	E.	91 28 31	2261	89 41 34	2260	87 54 36	2260	86 7 37	2259
15	Aldebaran	W.	102 50 15	2200	104 38 43	2202	106 27 8	2204	108 15 29	2207
	Saturn	W.	77 53 40	2235	79 41 15	2237	81 28 47	2240	83 16 15	2242
	Pollux	W.	59 33 57	2304	61 19 50	2300	63 5 46	2298	64 51 43	2302
	Spica	E.	31 18 40	2260	29 31 54	2279	27 45 23	2291	25 59 10	2305
	Antares	E.	77 12 50	2266	75 26 1	2269	73 39 16	2272	71 52 36	2277
16	Saturn	W.	92 12 18	2264	93 59 10	2270	95 45 54	2277	97 32 28	2283
	Pollux	W.	73 41 5	2313	75 26 46	2317	77 12 20	2322	78 57 47	2328
	Regulus	W.	37 11 4	2235	38 58 39	2241	40 46 6	2247	42 33 24	2253
	Mars	W.	29 31 37	2261	31 18 34	2264	33 5 26	2268	34 52 13	2273
	Antares	E.	63 1 13	2309	61 15 26	2317	59 29 52	2326	57 44 31	2336
17	Saturn	W.	106 22 35	2294	108 7 59	2304	109 53 9	2344	111 38 5	2355
	Pollux	W.	87 42 43	2365	89 27 8	2374	91 11 20	2384	92 55 18	2394
	Regulus	W.	51 27 25	2291	53 13 38	2299	54 59 38	2309	56 45 24	2320
	Mars	W.	43 44 2	2307	45 29 51	2315	47 15 28	2324	49 0 52	2334
	Antares	E.	49 1 47	2400	47 16 12	2416	45 35 0	2433	43 52 12	2452
18	Regulus	W.	65 30 25	2375	67 14 36	2387	68 58 30	2400	70 42 5	2413
	Mars	W.	57 44 6	2396	59 27 55	2402	61 11 27	2415	62 54 41	2428
	Jupiter	W.	35 59 59	2349	37 44 57	2356	39 29 37	2367	41 13 59	2380
	Antares	E.	35 25 31	2571	33 45 56	2601	32 7 3	2634	30 28 57	2675
19	Regulus	W.	79 15 19	2481	80 56 59	2495	82 38 19	2510	84 19 19	2524
	Mars	W.	71 26 2	2497	73 7 19	2512	74 48 15	2527	76 28 50	2542
	Jupiter	W.	49 51 3	2440	51 33 29	2463	53 15 34	2477	54 57 19	2492
	Spica	W.	26 4 36	2544	27 44 20	2560	29 23 57	2577	31 3 24	2596
	α Aquilæ	E.	72 40 11	2980	71 9 33	3006	69 39 26	3031	68 9 52	3059
20	Regulus	W.	92 39 9	2600	94 18 4	2615	95 56 39	2630	97 34 53	2646
	Mars	W.	84 46 30	2608	86 24 53	2635	88 3 5	2651	89 40 51	2667
	Jupiter	W.	63 20 51	2528	65 0 30	2543	66 39 49	2598	68 18 47	2613
	Spica	W.	39 17 24	2639	40 55 26	2652	42 33 10	2665	44 10 37	2678
	α Aquilæ	E.	60 50 56	3217	59 25 7	3253	58 0 1	3290	56 35 41	3333
	Fomalhaut	E.	93 0 14	2939	91 28 36	2947	89 57 17	2962	88 26 17	2977
21	Regulus	W.	105 40 52	2722	107 17 3	2737	108 52 54	2751	110 28 26	2766
	Jupiter	W.	76 28 24	2689	78 5 18	2704	79 41 53	2719	81 18 8	2734
	Spica	W.	52 13 21	2747	53 48 59	2760	55 24 19	2774	56 59 21	2788
	α Aquilæ	E.	49 46 41	3670	48 27 44	3697	47 9 50	3730	45 53 3	3764

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Noon.	P.L. of Diff.	IIIh.	P.L. of Diff.	VIh.	P.L. of Diff.	IXh.	P.L. of Diff.
21	Fomalhaut	E.	[illegible]	[illegible]	35 25 15	[illegible]	33 55 16	[illegible]	32 25 38	[illegible]
	Venus	E.	[illegible]	[illegible]	16 17 14	[illegible]	14 45 10	[illegible]	[illegible] 17 7	[illegible]
22	Jupiter	W.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible] 54	[illegible]
	Spica	W.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	63 16 30	[illegible]
	α Aquilae	E.	44 [illegible]	[illegible]	43 23 [illegible]	[illegible]	42 10 9	[illegible]	40 56 35	4190
	Fomalhaut	E.	75 [illegible]	3140	73 35 44	3160	72 [illegible] 45	3181	70 42 15	3203
	Venus	E.	[illegible]	[illegible]	[illegible] 23 [illegible]	[illegible]	52 54 15	[illegible]	51 26 51	3153
	α Pegasi	E.	[illegible]	[illegible]	[illegible] 10 22	[illegible]	[illegible] 41 25	[illegible]	85 12 46	3091
	Sun	E.	131 38 22	3141	130 [illegible] 3	3158	128 42 1	[illegible]	127 15 16	3185
23	Jupiter	W.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	100 9 24	2891
	Spica	W.	71 1 [illegible]	[illegible]	72 23 44	2916	74 5 42	[illegible]	75 37 25	2930
	Antares	W.	[illegible]	[illegible]	[illegible]	[illegible]	29 25 30	[illegible]	30 52 19	3157
	Fomalhaut	E.	[illegible]	[illegible]	62 12 10	[illegible]	60 48 45	[illegible]	59 25 49	3392
	Venus	E.	74 16 21	[illegible]	72 50 43	[illegible]	71 25 20	[illegible]	70 0 12	3365
	α Pegasi	E.	77 54 13	[illegible]	76 27 26	[illegible]	75 0 52	[illegible]	73 34 49	3317
	Sun	E.	[illegible]	[illegible]	[illegible] 40 43	[illegible]	117 15 53	[illegible]	115 51 18	3392
24	Spica	W.	[illegible] 12 36	[illegible]	84 43 0	[illegible]	86 13 13	[illegible]	87 43 16	3017
	Antares	W.	[illegible]	3124	[illegible] 36 6	3132	41 3 35	3133	42 31 5	3133
	Fomalhaut	E.	[illegible]	[illegible]	51 19 14	[illegible]	50 0 9	[illegible]	48 41 43	3646
	Venus	E.	[illegible] 10	[illegible]	61 34 25	3333	60 10 52	3344	58 47 31	3353
	α Pegasi	E.	[illegible]	[illegible]	65 4 47	3318	63 40 56	3336	62 17 25	3352
	Sun	E.	108 51 46	3347	107 28 29	3358	106 5 24	3367	104 42 30	3376
25	Antares	W.	49 48 17	[illegible]	51 15 39	3141	52 42 59	3142	54 10 18	3143
	Fomalhaut	E.	[illegible]	[illegible]	41 6 44	3933	39 53 58	3997	38 42 15	4065
	Venus	E.	51 53 17	3393	50 30 52	3399	49 8 34	3405	47 46 23	3411
	α Pegasi	E.	55 25 10	3451	54 3 51	3472	52 42 56	3495	51 22 26	3519
	Sun	E.	97 50 [illegible]	3414	96 28 21	3420	95 6 27	3426	93 44 40	3431
26	Antares	W.	[illegible] 20 38	3148	62 53 52	3145	64 21 7	3143	65 48 24	3142
	Venus	E.	40 [illegible] 51	3430	39 35 8	3432	38 13 28	3434	36 51 50	3436
	α Pegasi	E.	44 47 9	[illegible]	43 29 34	3697	42 12 44	3736	40 56 35	3777
	Sun	E.	[illegible]	3448	85 35 34	3450	84 14 14	3452	82 52 56	3453
27	Antares	W.	73 5 11	3133	74 32 40	3130	76 0 13	3127	77 27 50	3123
	α Aquilae	W.	33 40 18	[illegible]	34 36 56	4874	35 35 32	4742	36 35 56	4633
	Sun	E.	76 [illegible] 30	3450	74 45 10	3448	73 23 48	3446	72 2 23	3442
28	Antares	W.	84 47 13	[illegible]	[illegible] 15 24	[illegible]	87 43 42	[illegible]	89 12 8	[illegible]
	α Aquilae	W.	42 0 46	[illegible]	43 9 34	4109	44 19 27	[illegible]	45 30 21	[illegible]
	Sun	E.	[illegible] 14 14	[illegible]	[illegible] 52 20	3415	62 30 20	[illegible]	61 8 13	3401
29	Antares	W.	[illegible]	[illegible]	[illegible] 5 42	[illegible]	99 35 11	[illegible]	101 4 50	3019
	α Aquilae	W.	[illegible]	[illegible]	[illegible] 37	[illegible]	54 10 29	[illegible]	55 27 40	3642
	Sun	E.	[illegible]	[illegible]	[illegible]	[illegible]	51 29 31	[illegible]	50 6 13	3338
30	Antares	W.	[illegible] 48	[illegible]	110 6 34	[illegible]	111 37 52	[illegible]	113 8 42	2944
	α Aquilae	W.	[illegible]	[illegible]	[illegible] 23 0	[illegible]	64 44 3	[illegible]	66 5 34	3415
	Sun	E.	43 [illegible] 1	[illegible]	41 42 36	[illegible]	40 18 0	[illegible]	38 53 12	[illegible]

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Name and Direction of Object.		Midnight.	P. L. of Diff.	XVh.	P. L. of Diff.	XVIIIh.	P. L. of Diff.	XXIh.	P. L. of Diff.
21	Fomalhaut	E.	80° 56′ 22″	3064	79° 27′ 28″	3062	77° 58′ 57″	3101	76° 30′ 49″	3121
	Venus	E.	91 47 25	3041	90 18 3	3058	88 49 2	3074	87 20 21	3091
22	Jupiter	W.	89 14 35	2804	90 48 58	2818	92 23 3	2831	93 56 51	2843
	Spica	W.	64 50 3	2856	66 23 20	2868	67 56 20	2880	69 29 4	2890
	α Aquilæ	E.	39 48 33	4201	38 40 8	4313	37 33 27	4436	36 28 38	4571
	Fomalhaut	E.	69 16 9	3294	67 50 28	3346	66 25 13	3399	65 0 25	3452
	Venus	E.	80 1 45	3168	78 34 58	3183	77 8 28	3198	75 42 16	3212
	α Pegasi	E.	83 44 26	3106	82 16 24	3122	80 48 41	3138	79 21 17	3153
	Sun	E.	125 48 49	3199	124 22 39	3214	122 56 46	3227	121 31 9	3241
23	Jupiter	W.	101 41 54	2909	103 14 10	2913	104 46 12	2904	106 18 0	2894
	Spica	W.	77 8 54	2950	78 40 9	2961	80 11 41	2971	81 42 0	2981
	Antares	W.	32 19 20	3148	33 46 31	3143	35 13 49	3138	36 41 12	3136
	Fomalhaut	E.	58 3 23	3419	56 41 28	3446	55 20 4	3476	53 59 13	3506
	Venus	E.	68 35 19	3277	67 10 41	3289	65 46 17	3301	64 22 7	3313
	α Pegasi	E.	72 9 0	3233	70 43 30	3250	69 18 20	3266	67 53 29	3283
	Sun	E.	114 26 57	3304	113 2 50	3315	111 38 56	3326	110 15 15	3337
24	Spica	W.	89 13 8	3025	90 42 50	3032	92 12 23	3039	93 41 47	3046
	Antares	W.	43 58 34	3134	45 26 2	3135	46 53 29	3137	48 20 54	3138
	Fomalhaut	E.	47 23 58	3686	46 6 56	3727	44 50 38	3773	43 35 8	3822
	Venus	E.	57 24 21	3362	56 1 21	3371	54 38 31	3379	53 15 50	3388
	α Pegasi	E.	60 54 14	3371	59 31 25	3391	58 8 58	3410	56 46 53	3430
	Sun	E.	103 19 46	3384	101 57 11	3393	100 34 46	3400	99 12 30	3408
25	Antares	W.	55 37 36	3143	57 4 53	3144	58 32 9	3146	59 59 24	3148
	Fomalhaut	E.	37 31 39	4141	36 22 17	4224	35 14 14	4316	34 7 38	4422
	Venus	E.	46 24 19	3415	45 2 20	3420	43 40 26	3424	42 18 37	3427
	α Pegasi	E.	50 2 23	3545	48 42 48	3571	47 23 42	3598	46 5 6	3626
	Sun	E.	92 22 58	3435	91 1 21	3439	89 39 49	3443	88 18 21	3446
26	Antares	W.	67 15 42	3142	68 43 1	3140	70 10 22	3138	71 37 45	3136
	Venus	E.	35 30 13	3436	34 8 37	3436	32 47 1	3436	31 25 25	3434
	α Pegasi	E.	39 41 9	3653	38 26 31	3674	37 12 45	3699	35 59 55	3722
	Sun	E.	81 31 39	3453	80 10 22	3453	78 49 5	3453	77 27 48	3452
27	Antares	W.	78 55 32	3119	80 23 19	3114	81 51 11	3110	83 19 9	3106
	α Aquilæ	W.	37 38 1	4516	38 41 39	4419	39 46 43	4331	40 53 7	4250
	Sun	E.	70 40 54	3438	69 19 21	3435	67 57 44	3431	66 36 2	3425
28	Antares	W.	90 40 42	3073	92 9 24	3066	93 38 15	3060	95 7 14	3052
	α Aquilæ	W.	46 42 12	3934	47 54 57	3864	49 8 33	3836	50 22 56	3793
	Sun	E.	59 45 58	3394	58 23 35	3387	57 1 4	3380	55 38 25	3372
29	Antares	W.	102 34 39	3010	104 4 39	3001	105 34 51	2993	107 5 14	2983
	α Aquilæ	W.	56 45 29	3610	58 3 53	3577	59 22 52	3547	60 42 24	3519
	Sun	E.	48 42 45	3328	47 19 6	3319	45 55 16	3308	44 31 14	3296
30	Antares	W.	114 40 3	2935	116 11 37	2926	117 43 23	2917	119 15 20	2909
	α Aquilæ	W.	67 27 33	3398	68 49 59	3370	70 12 50	3346	71 36 6	3327
	Sun	E.	37 28 12	3246	36 3 0	3236	34 37 36	3229	33 12 1	3220

AT GREENWICH APPARENT NOON.

Day of the Week.	Day of the Month.	THE SUN'S Apparent Right Ascension.	Diff. for 1 Hour.	Apparent Declination.	Diff. for 1 Hour.	Semi-diameter.	Sidereal Time of Semi-diameter Passing Meridian.	Equation of Time, to be Subtracted from Apparent Time.	Diff. for 1 Hour.
		h m s	s	° ′ ″	″	′ ″	s	m s	s
Sat.	1	2 34 18.19	9.548	N. 15 8 9.6	+45.26	15 54.18	66.07	3 2.45	0.307
SUN.	2	2 38 7.36	9.571	15 26 8.8	44.63	15 53.94	66.15	3 9.55	0.284
Mon.	3	2 41 57.35	9.594	15 43 51.8	43.99	15 53.71	66.23	3 16.10	0.261
Tues.	4	2 45 48.09	9.617	16 1 19.7	+43.33	15 53.48	66.31	3 22.09	0.238
Wed.	5	2 49 39.19	9.640	16 18 31.6	42.66	15 53.25	66.39	3 27.53	0.215
Thur.	6	2 53 30.85	9.664	16 35 27.3	41.98	15 53.03	66.47	3 32.41	0.191
Frid.	7	2 57 23.06	9.688	16 52 6.5	+41.28	15 52.81	66.55	3 36.74	0.168
Sat.	8	3 1 15.83	9.711	17 8 28.8	40.57	15 52.60	66.64	3 40.51	0.145
SUN.	9	3 5 9.16	9.734	17 24 34.2	39.85	15 52.39	66.72	3 43.73	0.122
Mon.	10	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Tues.	11	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.076
Wed.	12	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Thur.	13	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Frid.	14	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Sat.	15	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
SUN.	16	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Mon.	17	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Tues.	18	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	19	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	20	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

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AT GREENWICH MEAN NOON.

Day of the Week.	Day of the Month.	THE SUN'S Apparent Right Ascension.	Diff. for 1 Hour.	Apparent Declination.	Diff. for 1 Hour.	Equation of Time, to be Added to Mean Time.	Diff. for 1 Hour.	Sidereal Time, or Right Ascension of Mean Sun.
		h m s	s	° ′ ″	″	m s	s	h m s
Sat.	1	2 34 18.60	9.549	N. 15 8 11.9	+45.26	3 2.48	0.307	2 37 21.08
SUN.	2	2 38 8.06	9.572	15 26 10.6	44.63	3 9.57	0.284	2 41 17.63
Mon.	3	2 41 58.07	9.595	15 43 54.1	43.99	3 16.11	0.261	2 45 14.18
Tues.	4	2 45 48.63	9.618	16 1 22.1	+43.33	3 22.10	0.238	2 49 10.73
Wed.	5	2 49 39.75	9.641	16 18 34.1	42.66	3 27.54	0.215	2 53 7.29
Thur.	6	2 53 31.43	9.665	16 35 29.8	41.98	3 32.42	0.191	2 57 3.84
Frid.	7	2 57 23.65	9.688	16 52 9.0	+41.28	3 36.75	0.168	3 1 0.40
Sat.	8	3 1 16.43	9.711	17 8 31.3	40.57	3 40.52	0.145	3 4 56.95
SUN.	9	3 5 9.77	9.734	17 24 36.5	39.85	3 43.74	0.122	3 8 53.51
Mon.	10	3 9 3.66	9.757	17 40 24.2	+39.12	3 46.40	0.099	3 12 50.06
Tues.	11	3 12 58.11	9.780	17 55 54.2	38.37	3 48.51	0.076	3 16 46.62
Wed.	12	3 16 53.11	9.803	18 11 6.1	37.61	3 50.06	0.053	3 20 43.17
Thur.	13	3 20 48.67	9.826	18 25 59.5	+36.83	3 51.06	0.030	3 24 39.73
Frid.	14	3 24 44.79	9.850	18 40 34.2	36.05	3 51.49	0.006	3 28 36.28
Sat.	15	3 28 41.46	9.873	18 54 50.1	35.25	3 51.37	0.017	3 32 32.84
SUN.	16	3 32 38.70	9.897	19 8 46.8	+34.45	3 50.69	0.041	3 36 29.39
Mon.	17	3 36 36.49	9.920	19 22 24.1	33.63	3 49.46	0.064	3 40 25.95
Tues.	18	3 40 34.83	9.943	19 35 41.7	32.81	3 47.67	0.087	3 44 22.50
Wed.	19	3 44 33.74	9.966	19 48 39.3	+31.97	3 45.32	0.110	3 48 19.06
Thur.	20	3 48 33.20	9.989	20 1 16.7	31.13	3 42.41	0.133	3 52 15.61
Frid.	21	3 52 33.21	10.012	20 13 33.6	30.27	3 38.96	0.156	3 56 12.17
Sat.	22	3 56 33.76	10.034	20 25 29.8	+29.41	3 34.96	0.178	4 0 8.72
SUN.	23	4 0 34.86	10.057	20 37 5.2	28.54	3 30.42	0.201	4 4 5.28
Mon.	24	4 4 36.50	10.079	20 48 19.4	27.65	3 25.34	0.223	4 8 1.84
Tues.	25	4 8 38.66	10.101	20 59 12.2	+26.75	3 19.74	0.245	4 11 58.40
Wed.	26	4 12 41.33	10.122	21 9 43.3	25.84	3 13.62	0.266	4 15 54.95
Thur.	27	4 16 44.51	10.143	21 19 52.6	24.93	3 7.00	0.287	4 19 51.51
Frid.	28	4 20 48.19	10.163	21 29 39.9	+24.01	2 59.88	0.307	4 23 48.06
Sat.	29	4 24 52.33	10.182	21 39 5.0	23.08	2 52.29	0.326	4 27 44.62
SUN.	30	4 28 56.93	10.201	21 48 7.6	22.14	2 44.24	0.345	4 31 41.17
Mon.	31	4 33 1.98	10.219	21 56 47.5	21.19	2 35.75	0.363	4 35 37.73
Tues.	32	4 37 7.46	10.236	N. 22 5 4.5	+20.23	2 26.83	0.380	4 39 34.29

NOTE.—The semidiameter for mean noon may be assumed the same as that for apparent noon. The sign + prefixed to the hourly change of declination indicates that north declinations are increasing.

Diff. for 1 Hour, + 9s.8565. (Table III.)

GREENWICH MEAN TIME.

THE MOON'S

Day of the Month.	Semidiameter. Noon.	Semidiameter. Midnight.	Horizontal Parallax. Noon.	Diff. for 1 Hour.	Horizontal Parallax. Midnight.	Diff. for 1 Hour.	Upper Transit. Meridian of Greenwich.	Diff. for 1 Hour.	Age. Noon.
	′ ″	′ ″	′ ″	″	′ ″	″	h m	m	d
1	15 11.1	15 15.8	55 37.0	+1.39	55 54.2	+1.46	22 42.1	1.94	26.9
2	15 20.7	15 25.6	56 12.1	1.51	56 30.3	1.52	23 29.6	2.03	27.9
3	15 30.6	15 35.5	56 48.5	1.51	57 6.4	1.47	☽		28.9
4	15 40.2	15 44.7	57 23.8	+1.42	57 40.4	+1.34	0 19.6	2.14	0.4
5	15 49.0	15 52.9	57 56.0	1.25	58 10.3	1.14	1 12.2	2.25	1.4
6	15 56.4	15 59.6	58 23.3	1.03	58 34.9	0.91	2 7.2	2.34	2.4
7	16 2.3	16 4.7	58 45.1	+0.78	58 53.7	+0.66	3 3.9	2.39	3.4
8	16 6.6	16 8.2	59 0.9	0.54	59 6.7	0.43	4 1.4	2.39	4.4
9	16 9.4	16 10.3	59 11.2	0.32	59 14.3	+0.21	4 58.5	2.36	5.4
10	16 10.8	16 11.0	59 16.2	+0.10	59 16.8	0.00	5 54.4	2.29	6.4
11	16 10.8	16 10.3	59 16.3	−0.10	59 14.5	−0.20	6 48.7	2.23	7.4
12	16 9.5	16 8.4	59 11.5	0.30	59 7.2	0.41	7 41.4	2.17	8.4
13	16 6.8	16 4.9	59 1.6	−0.53	58 54.6	−0.64	8 32.9	2.13	9.4
14	16 2.7	16 0.0	58 46.3	0.75	58 36.5	0.88	9 23.8	2.11	10.4
15	15 56.9	15 53.5	58 25.3	0.99	58 12.7	1.10	10 14.5	2.12	11.4
16	15 49.7	15 45.6	57 58.7	−1.21	57 43.6	−1.30	11 5.5	2.14	12.4
17	15 41.2	15 36.6	57 27.5	1.38	57 10.5	1.44	11 57.0	2.15	13.4
18	15 31.8	15 26.9	56 52.9	1.48	56 34.9	1.50	12 48.6	2.15	14.4
19	15 22.0	15 17.2	56 16.9	−1.49	55 59.2	−1.46	13 40.1	2.13	15.4
20	15 12.5	15 8.0	55 42.0	1.40	55 25.6	1.32	14 30.9	2.09	16.4
21	15 3.9	15 0.1	55 10.3	1.21	54 56.5	1.08	15 20.4	2.03	17.4
22	14 56.8	14 53.9	54 44.3	−0.94	54 33.9	−0.78	16 8.3	1.96	18.4
23	14 51.7	14 50.1	54 25.7	0.59	54 19.7	−0.40	16 54.5	1.89	19.4
24	14 49.1	14 48.8	54 16.1	−0.20	54 14.9	+0.01	17 39.2	1.84	20.4
25	14 49.2	14 50.2	54 16.3	+0.22	54 20.3	+0.44	18 22.9	1.80	21.4
26	14 52.0	14 54.5	54 26.9	0.65	54 36.0	0.86	19 6.2	1.80	22.4
27	14 57.7	15 1.4	54 47.5	1.06	55 1.3	1.24	19 49.7	1.83	23.4
28	15 5.8	15 10.6	55 17.3	+1.41	55 35.2	+1.56	20 34.2	1.89	24.4
29	15 16.0	15 21.7	55 54.8	1.69	56 15.7	1.78	21 20.5	1.98	25.4
30	15 27.6	15 33.7	56 37.6	1.85	57 0.0	1.88	22 9.3	2.10	26.4
31	15 39.9	15 46.0	57 22.6	1.88	57 45.0	1.83	23 1.2	2.23	27.4
32	15 51.9	15 57.4	58 6.6	+1.75	58 27.0	+1.63	23 56.0	2.35	28.4

GREENWICH MEAN TIME.

THE MOON'S RIGHT ASCENSION AND DECLINATION.

SATURDAY 1.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
	h m s	s	° ′ ″	″
0	0 37 29.85	1.9831	N. 1 44 33.0	9.939
1	0 39 28.90	1.9853	1 54 29.4	9.941
2	0 41 28.09	1.9876	2 4 25.9	9.942
3	0 43 27.41	1.9898	2 14 22.4	9.941
4	0 45 26.86	1.9920	2 24 18.8	9.940
5	0 47 26.45	1.9944	2 34 15.2	9.939
6	0 49 26.19	1.9968	2 44 11.5	9.937
7	0 51 26.07	1.9992	2 54 7.6	9.933
8	0 53 26.10	2.0017	3 4 3.4	9.928
9	0 55 26.27	2.0041	3 13 59.0	9.924
10	0 57 26.59	2.0067	3 23 54.3	9.918
11	0 59 27.07	2.0092	3 33 49.2	9.912
12	1 1 27.70	2.0118	3 43 43.7	9.905
13	1 3 28.49	2.0145	3 53 37.8	9.897
14	1 5 29.44	2.0172	4 3 31.3	9.888
15	1 7 30.56	2.0200	4 13 24.3	9.878
16	1 9 31.84	2.0227	4 23 16.7	9.868
17	1 11 33.29	2.0255	4 33 8.4	9.857
18	1 13 34.90	2.0283	4 42 59.5	9.845
19	1 15 36.69	2.0312	4 52 49.8	9.832
20	1 17 38.65	2.0342	5 2 39.3	9.818
21	1 19 40.79	2.0372	5 12 28.0	9.804
22	1 21 43.11	2.0402	5 22 15.8	9.788
23	1 23 45.61	2.0432	N. 5 32 2.6	9.772

SUNDAY 2.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
0	1 25 48.29	2.0463	N. 5 41 48.4	9.755
1	1 27 51.16	2.0493	5 51 33.2	9.737
2	1 29 54.21	2.0524	6 1 16.9	9.718
3	1 31 57.45	2.0556	6 10 59.4	9.698
4	1 34 0.89	2.0589	6 20 40.7	9.677
5	1 36 4.52	2.0621	6 30 20.7	9.656
6	1 38 8.34	2.0653	6 39 59.4	9.633
7	1 40 12.36	2.0687	6 49 36.7	9.610
8	1 42 16.58	2.0721	6 59 12.6	9.587
9	1 44 21.01	2.0755	7 8 47.1	9.562
10	1 46 25.64	2.0788	7 18 20.1	9.536
11	1 48 30.47	2.0822	7 27 51.4	9.509
12	1 50 35.50	2.0856	7 37 21.1	9.481
13	1 52 40.74	2.0891	7 46 49.1	9.452
14	1 54 46.20	2.0927	7 56 15.4	9.423
15	1 56 51.87	2.0962	8 5 39.9	9.392
16	1 58 57.75	2.0998	8 15 2.5	9.361
17	2 1 3.85	2.1034	8 24 23.2	9.328
18	2 3 10.16	2.1070	8 33 41.9	9.296
19	2 5 16.69	2.1107	8 42 58.6	9.261
20	2 7 23.45	2.1145	8 52 13.2	9.226
21	2 9 30.43	2.1182	9 1 25.7	9.189
22	2 11 37.63	2.1219	9 10 35.9	9.152
23	2 13 45.06	2.1257	9 19 43.9	9.114
24	2 15 52.71	2.1294	N. 9 28 49.6	9.075

MONDAY 3.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
	h m s	s	° ′ ″	″
0	2 15 52.71	2.1294	N. 9 28 49.6	9.075
1	2 18 0.59	2.1332	9 37 52.9	9.035
2	2 20 8.70	2.1371	9 46 53.8	8.993
3	2 22 17.04	2.1409	9 55 52.1	8.951
4	2 24 25.61	2.1448	10 4 47.9	8.908
5	2 26 34.42	2.1487	10 13 41.1	8.865
6	2 28 43.46	2.1527	10 22 31.7	8.820
7	2 30 52.74	2.1566	10 31 19.5	8.774
8	2 33 2.25	2.1606	10 40 4.5	8.727
9	2 35 12.00	2.1645	10 48 46.7	8.679
10	2 37 21.99	2.1685	10 57 26.0	8.630
11	2 39 32.22	2.1725	11 6 2.3	8.579
12	2 41 42.69	2.1765	11 14 35.5	8.528
13	2 43 53.40	2.1805	11 23 5.7	8.477
14	2 46 4.35	2.1846	11 31 32.7	8.423
15	2 48 15.55	2.1887	11 39 56.5	8.369
16	2 50 26.99	2.1927	11 48 17.0	8.314
17	2 52 38.67	2.1968	11 56 34.2	8.258
18	2 54 50.60	2.2009	12 4 48.0	8.201
19	2 57 2.78	2.2050	12 12 58.3	8.143
20	2 59 15.20	2.2091	12 21 5.1	8.084
21	3 1 27.87	2.2132	12 29 8.4	8.024
22	3 3 40.78	2.2173	12 37 8.0	7.962
23	3 5 53.94	2.2214	N.12 45 3.9	7.900

TUESDAY 4.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
0	3 8 7.35	2.2256	N.12 52 56.0	7.837
1	3 10 21.01	2.2297	13 0 44.3	7.773
2	3 12 34.91	2.2338	13 8 28.7	7.708
3	3 14 49.06	2.2379	13 16 9.2	7.642
4	3 17 3.46	2.2420	13 23 45.7	7.574
5	3 19 18.10	2.2461	13 31 18.1	7.506
6	3 21 32.99	2.2502	13 38 46.4	7.437
7	3 23 48.13	2.2544	13 46 10.5	7.367
8	3 26 3.52	2.2585	13 53 30.4	7.296
9	3 28 19.15	2.2626	14 0 45.9	7.223
10	3 30 35.02	2.2666	14 7 57.0	7.149
11	3 32 51.14	2.2707	14 15 3.7	7.075
12	3 35 7.51	2.2748	14 22 6.0	7.000
13	3 37 24.12	2.2788	14 29 3.7	6.923
14	3 39 40.97	2.2829	14 35 56.8	6.846
15	3 41 58.07	2.2870	14 42 45.2	6.767
16	3 44 15.41	2.2909	14 49 28.9	6.688
17	3 46 32.98	2.2949	14 56 7.8	6.607
18	3 48 50.80	2.2989	15 2 41.8	6.526
19	3 51 8.86	2.3029	15 9 10.9	6.444
20	3 53 27.15	2.3068	15 15 35.1	6.362
21	3 55 45.68	2.3108	15 21 54.3	6.278
22	3 58 4.45	2.3147	15 28 8.4	6.193
23	4 0 23.45	2.3186	15 34 17.4	6.108
24	4 2 42.68	2.3225	N.15 40 21.2	6.022

GREENWICH MEAN TIME.

THE MOON'S RIGHT ASCENSION AND DECLINATION.

WEDNESDAY 5.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
	h m s	s	° ′ ″	″
0	4 2 42.68	2.3226	N.15 40 21.2	6.019
1	4 5 2.15	2.3263	15 46 19.7	5.932
2	4 7 21.84	2.3301	15 52 13.0	5.843
3	4 9 41.76	2.3338	15 58 0.9	5.753
4	4 12 1.90	2.3376	16 3 43.4	5.662
5	4 14 22.27	2.3413	16 9 20.4	5.571
6	4 16 42.86	2.3450	16 14 51.9	5.478
7	4 19 3.67	2.3487	16 20 17.8	5.385
8	4 21 24.70	2.3523	16 25 38.1	5.292
9	4 23 45.94	2.3558	16 30 52.8	5.198
10	4 26 7.40	2.3594	16 36 1.8	5.102
11	4 28 29.07	2.3629	16 41 5.0	5.004
12	4 30 50.95	2.3664	16 46 2.3	4.906
13	4 33 13.04	2.3698	16 50 53.7	4.808
14	4 35 35.33	2.3732	16 55 39.3	4.710
15	4 37 57.82	2.3765	17 0 18.9	4.609
16	4 40 20.51	2.3798	17 4 52.4	4.508
17	4 42 43.40	2.3832	17 9 19.9	4.407
18	4 45 6.49	2.3864	17 13 41.3	4.305
19	4 47 29.77	2.3896	17 17 56.5	4.202
20	4 49 53.23	2.3926	17 22 5.5	4.097
21	4 52 16.88	2.3957	17 26 8.2	3.992
22	4 54 40.71	2.3987	17 30 4.6	3.887
23	4 57 4.72	2.4017	N.17 33 54.7	3.780

THURSDAY 6.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
0	4 59 28.91	2.4046	N.17 37 38.5	3.676
1	5 1 53.27	2.4074	17 41 15.8	3.568
2	5 4 17.80	2.4102	17 44 46.6	3.459
3	5 6 42.50	2.4130	17 48 10.9	3.351
4	5 9 7.36	2.4157	17 51 28.7	3.242
5	5 11 32.38	2.4183	17 54 40.0	3.133
6	5 13 57.56	2.4209	17 57 44.7	3.022
7	5 16 22.89	2.4234	18 0 42.7	2.911
8	5 18 48.37	2.4259	18 3 34.0	2.799
9	5 21 14.00	2.4283	18 6 18.6	2.687
10	5 23 39.77	2.4306	18 8 56.4	2.574
11	5 26 5.67	2.4328	18 11 27.5	2.461
12	5 28 31.71	2.4351	18 13 51.8	2.347
13	5 30 57.88	2.4372	18 16 9.2	2.232
14	5 33 24.18	2.4393	18 18 19.7	2.118
15	5 35 50.60	2.4413	18 20 23.4	2.003
16	5 38 17.14	2.4432	18 22 20.1	1.888
17	5 40 43.79	2.4451	18 24 9.9	1.773
18	5 43 10.55	2.4469	18 25 52.8	1.656
19	5 45 37.42	2.4487	18 27 28.7	1.539
20	5 48 4.39	2.4504	18 28 57.5	1.422
21	5 50 31.46	2.4520	18 30 19.3	1.304
22	5 52 58.63	2.4536	18 31 34.0	1.186
23	5 55 25.89	2.4551	18 32 41.6	1.068
24	5 57 53.24	2.4565	N.18 33 42.2	0.950

FRIDAY 7.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
	h m s	s	° ′ ″	″
0	5 57 53.24	2.4565	N.18 33 42.2	0.950
1	6 0 20.67	2.4578	18 34 35.6	0.831
2	6 2 48.17	2.4590	18 35 21.9	0.712
3	6 5 15.75	2.4602	18 36 1.1	0.593
4	6 7 43.40	2.4613	18 36 33.1	0.474
5	6 10 11.11	2.4623	18 36 58.0	0.355
6	6 12 38.88	2.4633	18 37 15.7	0.235
7	6 15 6.71	2.4642	18 37 26.2	+ 0.115
8	6 17 34.59	2.4651	18 37 29.5	− 0.005
9	6 20 2.52	2.4659	18 37 25.6	0.125
10	6 22 30.50	2.4666	18 37 14.5	0.245
11	6 24 58.51	2.4672	18 36 56.2	0.366
12	6 27 26.56	2.4677	18 36 30.6	0.487
13	6 29 54.64	2.4682	18 35 57.8	0.607
14	6 32 22.74	2.4686	18 35 17.8	0.727
15	6 34 50.87	2.4689	18 34 30.6	0.847
16	6 37 19.01	2.4692	18 33 36.1	0.968
17	6 39 47.17	2.4694	18 32 34.4	1.088
18	6 42 15.34	2.4695	18 31 25.5	1.208
19	6 44 43.51	2.4696	18 30 9.4	1.328
20	6 47 11.68	2.4696	18 28 46.1	1.449
21	6 49 39.85	2.4695	18 27 15.5	1.570
22	6 52 8.02	2.4693	18 25 37.7	1.689
23	6 54 36.17	2.4690	N.18 23 52.8	1.808

SATURDAY 8.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
0	6 57 4.30	2.4687	N.18 22 0.7	1.928
1	6 59 32.41	2.4683	18 20 1.4	2.047
2	7 2 0.50	2.4679	18 17 55.0	2.167
3	7 4 28.56	2.4674	18 15 41.4	2.286
4	7 6 56.59	2.4668	18 13 20.7	2.405
5	7 9 24.58	2.4662	18 10 52.8	2.524
6	7 11 52.54	2.4656	18 8 17.8	2.642
7	7 14 20.45	2.4648	18 5 35.8	2.759
8	7 16 48.31	2.4639	18 2 46.7	2.877
9	7 19 16.12	2.4631	17 59 50.5	2.995
10	7 21 43.88	2.4622	17 56 47.3	3.112
11	7 24 11.58	2.4612	17 53 37.1	3.228
12	7 26 39.22	2.4601	17 50 20.0	3.343
13	7 29 6.79	2.4590	17 46 55.9	3.459
14	7 31 34.29	2.4578	17 43 24.9	3.575
15	7 34 1.72	2.4566	17 39 46.9	3.690
16	7 36 29.08	2.4552	17 36 2.1	3.804
17	7 38 56.35	2.4538	17 32 10.4	3.918
18	7 41 23.54	2.4524	17 28 11.9	4.032
19	7 43 50.64	2.4509	17 24 6.6	4.144
20	7 46 17.65	2.4495	17 19 54.6	4.257
21	7 48 44.58	2.4480	17 15 35.8	4.369
22	7 51 11.41	2.4464	17 11 10.3	4.480
23	7 53 38.14	2.4447	17 6 38.2	4.590
24	7 56 4.77	2.4430	N.17 1 59.5	4.700

GREENWICH MEAN TIME.

THE MOON'S RIGHT ASCENSION AND DECLINATION.

SUNDAY 9.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
	h m s	s	° ′ ″	″
0	7 56 4.77	2.4429	N.17 1 59.5	4.700
1	7 58 31.29	2.4412	16 57 14.2	4.810
2	8 0 57.71	2.4394	16 52 22.3	4.919
3	8 3 24.02	2.4376	16 47 23.9	5.027
4	8 5 50.22	2.4357	16 42 19.0	5.135
5	8 8 16.30	2.4337	16 37 7.7	5.243
6	8 10 42.27	2.4318	16 31 49.9	5.350
7	8 13 8.12	2.4298	16 26 25.7	5.455
8	8 15 33.85	2.4277	16 20 55.3	5.559
9	8 17 59.45	2.4256	16 15 18.6	5.663
10	8 20 24.92	2.4235	16 9 35.7	5.767
11	8 22 50.27	2.4214	16 3 46.6	5.870
12	8 25 15.49	2.4192	15 57 51.3	5.972
13	8 27 40.57	2.4169	15 51 49.9	6.073
14	8 30 5.52	2.4147	15 45 42.5	6.173
15	8 32 30.34	2.4125	15 39 29.1	6.273
16	8 34 55.02	2.4102	15 33 9.7	6.372
17	8 37 19.56	2.4078	15 26 44.4	6.471
18	8 39 43.96	2.4054	15 20 13.2	6.568
19	8 42 8.21	2.4030	15 13 36.2	6.664
20	8 44 32.32	2.4007	15 6 53.5	6.760
21	8 46 56.29	2.3983	15 0 5.0	6.856
22	8 49 20.11	2.3958	14 53 10.8	6.949
23	8 51 43.78	2.3933	N.14 46 11.1	7.042

MONDAY 10.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
0	8 54 7.30	2.3908	N.14 39 5.8	7.134
1	8 56 30.67	2.3883	14 31 55.0	7.226
2	8 58 53.89	2.3858	14 24 38.7	7.317
3	9 1 16.96	2.3833	14 17 17.0	7.406
4	9 3 39.88	2.3807	14 9 50.0	7.494
5	9 6 2.64	2.3781	14 2 17.7	7.582
6	9 8 25.25	2.3755	13 54 40.2	7.668
7	9 10 47.70	2.3729	13 46 57.5	7.754
8	9 13 10.00	2.3703	13 39 9.7	7.839
9	9 15 32.14	2.3678	13 31 16.8	7.923
10	9 17 54.13	2.3652	13 23 18.9	8.007
11	9 20 15.96	2.3625	13 15 16.0	8.088
12	9 22 37.63	2.3599	13 7 8.3	8.168
13	9 24 59.15	2.3573	12 58 55.8	8.249
14	9 27 20.51	2.3547	12 50 38.4	8.329
15	9 29 41.71	2.3520	12 42 16.3	8.407
16	9 32 2.75	2.3494	12 33 49.6	8.484
17	9 34 23.64	2.3468	12 25 18.3	8.560
18	9 36 44.37	2.3442	12 16 42.4	8.636
19	9 39 4.94	2.3416	12 8 2.0	8.709
20	9 41 25.36	2.3390	11 59 17.3	8.782
21	9 43 45.62	2.3363	11 50 28.2	8.854
22	9 46 5.72	2.3337	11 41 34.8	8.925
23	9 48 25.67	2.3312	11 32 37.2	8.994
24	9 50 45.47	2.3287	N.11 23 35.5	9.063

TUESDAY 11.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
	h m s	s	° ′ ″	″
0	9 50 45.47	2.3287	N.11 23 35.5	9.063
1	9 53 5.11	2.3261	11 14 29.6	9.132
2	9 55 24.60	2.3236	11 5 19.7	9.198
3	9 57 43.94	2.3210	10 56 5.8	9.264
4	10 0 3.12	2.3184	10 46 48.0	9.329
5	10 2 22.15	2.3159	10 37 26.3	9.392
6	10 4 41.03	2.3134	10 28 0.9	9.455
7	10 6 59.76	2.3109	10 18 31.7	9.517
8	10 9 18.34	2.3084	10 8 58.8	9.577
9	10 11 36.77	2.3060	9 59 22.4	9.636
10	10 13 55.06	2.3036	9 49 42.5	9.694
11	10 16 13.20	2.3012	9 39 59.1	9.752
12	10 18 31.20	2.2988	9 30 12.2	9.809
13	10 20 49.06	2.2964	9 20 22.0	9.864
14	10 23 6.77	2.2940	9 10 28.5	9.918
15	10 25 24.34	2.2917	9 0 31.8	9.971
16	10 27 41.77	2.2893	8 50 32.0	10.022
17	10 29 59.06	2.2871	8 40 29.2	10.072
18	10 32 16.22	2.2848	8 30 23.4	10.122
19	10 34 33.24	2.2826	8 20 14.6	10.171
20	10 36 50.13	2.2803	8 10 2.9	10.218
21	10 39 6.88	2.2781	7 59 48.4	10.265
22	10 41 23.50	2.2760	7 49 31.1	10.310
23	10 43 40.00	2.2739	N. 7 39 11.2	10.354

WEDNESDAY 12.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
0	10 45 56.37	2.2718	N. 7 28 48.7	10.397
1	10 48 12.62	2.2697	7 18 23.6	10.438
2	10 50 28.74	2.2676	7 7 56.1	10.478
3	10 52 44.73	2.2655	6 57 26.2	10.518
4	10 55 0.60	2.2636	6 46 53.9	10.557
5	10 57 16.36	2.2617	6 36 19.3	10.594
6	10 59 32.00	2.2597	6 25 42.6	10.630
7	11 1 47.53	2.2578	6 15 3.7	10.666
8	11 4 2.94	2.2559	6 4 22.7	10.700
9	11 6 18.24	2.2541	5 53 39.7	10.733
10	11 8 33.43	2.2523	5 42 54.7	10.765
11	11 10 48.51	2.2505	5 32 7.9	10.795
12	11 13 3.49	2.2488	5 21 19.3	10.825
13	11 15 18.37	2.2471	5 10 28.9	10.854
14	11 17 33.14	2.2454	4 59 36.8	10.882
15	11 19 47.81	2.2437	4 48 43.1	10.907
16	11 22 2.38	2.2421	4 37 47.9	10.932
17	11 24 16.86	2.2406	4 26 51.3	10.956
18	11 26 31.25	2.2391	4 15 53.3	10.978
19	11 28 45.55	2.2375	4 4 53.9	11.001
20	11 30 59.75	2.2360	3 53 53.2	11.022
21	11 33 13.86	2.2345	3 42 51.3	11.041
22	11 35 27.89	2.2330	3 31 48.3	11.060
23	11 37 41.84	2.2318	3 20 44.2	11.077
24	11 39 55.71	2.2306	N. 3 9 39.1	11.093

GREENWICH MEAN TIME.

THE MOON'S RIGHT ASCENSION AND DECLINATION.

MONDAY 17.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
	h m s	s	° ′ ″	″
0	15 12 37.78	2.2338	S. 13 8 40.8	7.767
1	15 14 51.82	2.2343	13 16 24.5	7.689
2	15 17 5.90	2.2349	13 24 3.5	7.611
3	15 19 20.01	2.2355	13 31 37.8	7.532
4	15 21 34.16	2.2361	13 39 7.3	7.451
5	15 23 48.34	2.2366	13 46 31.9	7.369
6	15 26 2.55	2.2371	13 53 51.6	7.288
7	15 28 16.79	2.2376	14 1 6.4	7.206
8	15 30 31.06	2.2381	14 8 16.3	7.123
9	15 32 45.36	2.2386	14 15 21.2	7.039
10	15 34 59.69	2.2391	14 22 21.0	6.955
11	15 37 14.05	2.2395	14 29 15.8	6.871
12	15 39 28.43	2.2399	14 36 5.5	6.786
13	15 41 42.84	2.2403	14 42 50.1	6.700
14	15 43 57.27	2.2407	14 49 29.5	6.613
15	15 46 11.73	2.2411	14 56 3.7	6.527
16	15 48 26.21	2.2414	15 2 32.7	6.440
17	15 50 40.70	2.2417	15 8 56.5	6.352
18	15 52 55.21	2.2420	15 15 15.0	6.264
19	15 55 9.74	2.2423	15 21 28.2	6.175
20	15 57 24.29	2.2426	15 27 36.0	6.086
21	15 59 38.85	2.2428	15 33 38.5	5.997
22	16 1 53.42	2.2430	15 39 35.6	5.906
23	16 4 8.01	2.2432	S. 15 45 27.2	5.815

TUESDAY 18.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
0	16 6 22.61	2.2433	S. 15 51 13.4	5.725
1	16 8 37.21	2.2434	15 56 54.2	5.633
2	16 10 51.82	2.2436	16 2 29.4	5.541
3	16 13 6.44	2.2437	16 7 59.1	5.449
4	16 15 21.06	2.2437	16 13 23.3	5.356
5	16 17 35.68	2.2436	16 18 41.9	5.263
6	16 19 50.29	2.2435	16 23 54.9	5.170
7	16 22 4.90	2.2435	16 29 2.3	5.077
8	16 24 19.51	2.2435	16 34 4.1	4.983
9	16 26 34.12	2.2434	16 39 0.3	4.889
10	16 28 48.72	2.2432	16 43 50.8	4.794
11	16 31 3.31	2.2430	16 48 35.6	4.699
12	16 33 17.88	2.2427	16 53 14.7	4.604
13	16 35 32.44	2.2425	16 57 48.1	4.508
14	16 37 46.98	2.2423	17 2 15.7	4.412
15	16 40 1.51	2.2420	17 6 37.6	4.317
16	16 42 16.02	2.2416	17 10 53.7	4.221
17	16 44 30.50	2.2412	17 15 4.1	4.125
18	16 46 44.96	2.2407	17 19 8.7	4.028
19	16 48 59.39	2.2403	17 23 7.5	3.931
20	16 51 13.80	2.2399	17 27 0.5	3.834
21	16 53 28.18	2.2393	17 30 47.6	3.737
22	16 55 42.52	2.2387	17 34 28.9	3.639
23	16 57 56.83	2.2382	17 38 4.3	3.542
24	17 0 11.10	2.2375	S. 17 41 33.9	3.444

WEDNESDAY 19.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
	h m s	s	° ′ ″	″
0	17 0 11.10	2.2375	S. 17 41 33.9	3.444
1	17 2 25.33	2.2368	17 44 57.6	3.347
2	17 4 39.52	2.2361	17 48 15.5	3.249
3	17 6 53.67	2.2354	17 51 27.5	3.151
4	17 9 7.77	2.2346	17 54 33.6	3.052
5	17 11 21.82	2.2338	17 57 33.8	2.954
6	17 13 35.83	2.2330	18 0 28.1	2.856
7	17 15 49.78	2.2321	18 3 16.5	2.758
8	17 18 3.68	2.2312	18 5 59.1	2.661
9	17 20 17.52	2.2302	18 8 35.8	2.562
10	17 22 31.30	2.2292	18 11 6.5	2.464
11	17 24 45.02	2.2281	18 13 31.4	2.366
12	17 26 58.67	2.2270	18 15 50.4	2.267
13	17 29 12.26	2.2259	18 18 3.5	2.169
14	17 31 25.78	2.2248	18 20 10.7	2.070
15	17 33 39.23	2.2236	18 22 11.9	1.971
16	17 35 52.61	2.2223	18 24 7.2	1.873
17	17 38 5.91	2.2211	18 25 56.7	1.776
18	17 40 19.14	2.2198	18 27 40.3	1.677
19	17 42 32.29	2.2184	18 29 18.0	1.579
20	17 44 45.35	2.2170	18 30 49.8	1.482
21	17 46 58.33	2.2156	18 32 15.8	1.384
22	17 49 11.22	2.2142	18 33 35.9	1.287
23	17 51 24.03	2.2127	S. 18 34 50.2	1.189

THURSDAY 20.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
0	17 53 36.75	2.2112	S. 18 35 58.6	1.092
1	17 55 49.37	2.2096	18 37 1.2	0.994
2	17 58 1.90	2.2081	18 37 57.9	0.897
3	18 0 14.34	2.2065	18 38 48.8	0.800
4	18 2 26.68	2.2048	18 39 33.9	0.703
5	18 4 38.91	2.2030	18 40 13.2	0.607
6	18 6 51.04	2.2013	18 40 46.7	0.510
7	18 9 3.07	2.1996	18 41 14.4	0.413
8	18 11 14.99	2.1978	18 41 36.3	0.317
9	18 13 26.80	2.1959	18 41 52.5	0.222
10	18 15 38.50	2.1941	18 42 3.0	0.127
11	18 17 50.09	2.1922	18 42 7.7	− 0.031
12	18 20 1.57	2.1903	18 42 6.7	+ 0.064
13	18 22 1[illegible]3	2.1883	18 42 0.0	0.159
14	18 24 24.17	2.1863	18 41 47.6	0.253
15	18 26 35.29	2.1843	18 41 29.6	0.348
16	18 28 46.29	2.1823	18 41 5.9	0.442
17	18 30 57.17	2.1802	18 40 36.6	0.535
18	18 33 7.92	2.1781	18 40 1.7	0.628
19	18 35 18.54	2.1760	18 39 21.2	0.722
20	18 37 29.04	2.1739	18 38 35.1	0.815
21	18 39 39.41	2.1717	18 37 43.4	0.907
22	18 41 49.65	2.1695	18 36 46.2	0.999
23	18 43 59.75	2.1673	18 35 43.5	1.091
24	18 46 9.72	2.1650	S. 18 34 35.2	1.183

GREENWICH MEAN TIME.

THE MOON'S RIGHT ASCENSION AND DECLINATION.

TUESDAY 25.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
	h m s	s	° ′ ″	″
0	22 2 28.45	1.9388	S. 10 44 57.4	7.858
1	22 4 24.74	1.9374	10 37 4.6	7.903
2	22 6 20.94	1.9360	10 29 9.0	7.949
3	22 8 17.06	1.9347	10 21 10.7	7.994
4	22 10 13.10	1.9333	10 13 9.7	8.038
5	22 12 9.06	1.9321	10 5 6.1	8.082
6	22 14 4.95	1.9309	9 56 59.9	8.125
7	22 16 0.77	1.9296	9 48 51.1	8.167
8	22 17 56.51	1.9284	9 40 39.8	8.210
9	22 19 52.18	1.9273	9 32 25.9	8.252
10	22 21 47.79	1.9263	9 24 9.5	8.293
11	22 23 43.34	1.9252	9 15 50.7	8.334
12	22 25 38.82	1.9242	9 7 29.4	8.375
13	22 27 34.24	1.9233	8 59 5.7	8.415
14	22 29 29.61	1.9224	8 50 39.6	8.454
15	22 31 24.93	1.9215	8 42 11.2	8.493
16	22 33 20.19	1.9206	8 33 40.4	8.531
17	22 35 15.40	1.9197	8 25 7.4	8.569
18	22 37 10.56	1.9190	8 16 32.1	8.607
19	22 39 5.68	1.9183	8 7 54.5	8.645
20	22 41 0.76	1.9176	7 59 14.7	8.681
21	22 42 55.79	1.9169	7 50 32.8	8.717
22	22 44 50.79	1.9164	7 41 48.7	8.752
23	22 46 45.76	1.9159	S. 7 33 2.5	8.787

WEDNESDAY 26.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
0	22 48 40.70	1.9154	S. 7 24 14.2	8.822
1	22 50 35.61	1.9149	7 15 23.8	8.857
2	22 52 30.49	1.9145	7 6 31.4	8.890
3	22 54 25.35	1.9142	6 57 37.0	8.923
4	22 56 20.19	1.9138	6 48 40.6	8.956
5	22 58 15.01	1.9135	6 39 42.3	8.989
6	23 0 9.81	1.9133	6 30 42.0	9.021
7	23 2 4.60	1.9131	6 21 39.8	9.052
8	23 3 59.38	1.9129	6 12 35.8	9.082
9	23 5 54.15	1.9128	6 3 30.0	9.112
10	23 7 48.92	1.9128	5 54 22.4	9.142
11	23 9 43.69	1.9128	5 45 13.0	9.171
12	23 11 38.45	1.9128	5 36 1.9	9.199
13	23 13 33.22	1.9129	5 26 49.1	9.228
14	23 15 28.00	1.9130	5 17 34.6	9.256
15	23 17 22.78	1.9132	5 8 18.4	9.283
16	23 19 17.58	1.9134	4 59 0.6	9.310
17	23 21 12.39	1.9137	4 49 41.2	9.336
18	23 23 7.22	1.9140	4 40 20.3	9.361
19	23 25 2.07	1.9143	4 30 57.9	9.386
20	23 26 56.94	1.9147	4 21 34.0	9.412
21	23 28 51.84	1.9152	4 12 8.5	9.436
22	23 30 46.77	1.9157	4 2 41.6	9.459
23	23 32 41.73	1.9163	3 53 13.4	9.482
24	23 34 36.73	1.9169	S. 3 43 43.8	9.505

THURSDAY 27.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
	h m s	s	° ′ ″	″
0	23 34 36.73	1.9169	S. 3 43 43.8	9.505
1	23 36 31.76	1.9175	3 34 12.8	9.527
2	23 38 26.83	1.9182	3 24 40.5	9.548
3	23 40 21.95	1.9190	3 15 7.0	9.569
4	23 42 17.11	1.9198	3 5 32.2	9.590
5	23 44 12.33	1.9207	2 55 56.2	9.609
6	23 46 7.60	1.9217	2 46 19.1	9.628
7	23 48 2.93	1.9226	2 36 40.8	9.647
8	23 49 58.31	1.9235	2 27 1.4	9.666
9	23 51 53.75	1.9246	2 17 20.9	9.684
10	23 53 49.26	1.9257	2 7 39.3	9.701
11	23 55 44.83	1.9268	1 57 56.8	9.717
12	23 57 40.47	1.9280	1 48 13.3	9.733
13	23 59 36.19	1.9292	1 38 28.8	9.749
14	0 1 31.98	1.9305	1 28 43.4	9.763
15	0 3 27.85	1.9318	1 18 57.2	9.777
16	0 5 23.80	1.9332	1 9 10.1	9.791
17	0 7 19.84	1.9347	0 59 22.2	9.804
18	0 9 15.97	1.9362	0 49 33.6	9.817
19	0 11 12.18	1.9377	0 39 44.2	9.829
20	0 13 8.49	1.9393	0 29 54.1	9.840
21	0 15 4.90	1.9410	0 20 3.4	9.851
22	0 17 1.41	1.9427	0 10 12.0	9.862
23	0 18 58.02	1.9444	S. 0 0 20.0	9.871

FRIDAY 28.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
0	0 20 54.74	1.9462	N. 0 9 32.5	9.879
1	0 22 51.57	1.9481	0 19 25.5	9.888
2	0 24 48.51	1.9499	0 29 19.0	9.896
3	0 26 45.56	1.9518	0 39 13.0	9.903
4	0 28 42.73	1.9538	0 49 7.4	9.909
5	0 30 40.02	1.9559	0 59 2.1	9.914
6	0 32 37.44	1.9580	1 8 57.1	9.919
7	0 34 34.98	1.9601	1 18 52.4	9.924
8	0 36 32.65	1.9623	1 28 48.0	9.928
9	0 38 30.46	1.9646	1 38 43.8	9.932
10	0 40 28.41	1.9669	1 48 39.8	9.934
11	0 42 26.49	1.9692	1 58 35.9	9.936
12	0 44 24.71	1.9716	2 8 32.1	9.937
13	0 46 23.08	1.9741	2 18 28.4	9.937
14	0 48 21.60	1.9765	2 28 24.6	9.937
15	0 50 20.26	1.9790	2 38 20.8	9.936
16	0 52 19.08	1.9816	2 48 16.9	9.934
17	0 54 18.06	1.9843	2 58 12.9	9.932
18	0 56 17.20	1.9870	3 8 8.8	9.929
19	0 58 16.50	1.9898	3 18 4.4	9.925
20	1 0 15.97	1.9926	3 27 59.8	9.921
21	1 2 15.61	1.9954	3 37 54.9	9.915
22	1 4 15.42	1.9983	3 47 49.6	9.909
23	1 6 15.41	2.0012	3 57 44.0	9.903
24	1 8 15.57	2.0042	N. 4 7 38.0	9.896

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Name and Direction of Object.		Noon.	P. L. of Diff.	IIIh.	P. L. of Diff.	VIh.	P. L. of Diff.	IXh.	P. L. of Diff.
1	α Aquilæ	W.	72° 59′ 46″	3306	74° 23′ 50″	3288	75° 48′ 16″	3269	77° 13′ 4″	3251
	Fomalhaut	W.	40 46 4	3667	42 3 26	3604	43 21 56	3545	44 41 30	3492
	Sun	E.	31 46 15	3210	30 20 18	3201	28 54 10	3193	27 27 53	3186
5	Sun	W.	17 33 41	2905	19 5 54	2875	20 38 45	2851	22 12 7	2830
	Pollux	E.	51 8 11	2583	49 28 53	2581	47 49 32	2580	46 10 10	2580
	Regulus	E.	86 32 57	2455	84 50 41	2446	83 8 12	2438	81 25 31	2430
	Mars	E.	96 14 12	2520	94 33 27	2512	92 52 30	2504	91 11 22	2496
6	Sun	W.	30 4 47	2755	31 40 14	2744	33 15 55	2734	34 51 50	2724
	Pollux	E.	37 54 8	2607	36 15 22	2619	34 36 53	2635	32 58 45	2653
	Regulus	E.	72 49 23	2393	71 5 38	2387	69 21 44	2381	67 37 42	2375
	Mars	E.	82 43 2	2460	81 0 53	2454	79 18 35	2448	77 36 9	2442
	Jupiter	E.	101 0 53	2375	99 16 43	2369	97 32 24	2363	95 47 56	2357
7	Sun	W.	42 54 22	2685	44 31 22	2678	46 8 31	2672	47 45 48	2666
	Regulus	E.	58 55 29	2348	57 10 40	2344	55 25 45	2340	53 40 44	2336
	Mars	E.	69 2 1	2417	67 18 51	2413	65 35 35	2408	63 52 12	2405
	Jupiter	E.	87 3 34	2331	85 18 20	2326	83 32 59	2322	81 47 32	2318
8	Sun	W.	55 53 58	2643	57 31 54	2640	59 9 55	2636	60 48 1	2633
	Regulus	E.	44 54 17	2320	43 8 46	2317	41 23 11	2315	39 37 33	2312
	Mars	E.	55 14 6	2389	53 30 16	2387	51 46 22	2384	50 2 25	2383
	Jupiter	E.	72 58 56	2302	71 12 59	2298	69 26 57	2296	67 40 51	2294
	Spica	E.	98 30 1	2333	96 44 50	2330	94 59 34	2327	93 14 14	2325
9	Sun	W.	68 59 29	2620	70 37 57	2618	72 16 27	2617	73 54 59	2615
	Saturn	W.	22 38 16	2403	24 21 46	2393	26 5 31	2384	27 49 29	2376
	Mars	E.	41 22 5	2375	39 37 55	2375	37 53 45	2375	36 9 34	2374
	Jupiter	E.	58 49 37	2285	57 3 15	2283	55 16 50	2281	53 30 23	2260
	Spica	E.	84 26 45	2315	82 41 7	2313	80 55 27	2312	79 9 45	2311
10	Sun	W.	82 8 6	2610	83 46 47	2610	85 25 29	2610	87 4 11	2610
	Saturn	W.	36 31 32	2353	38 16 14	2350	40 1 0	2348	41 45 50	2345
	Pollux	W.	22 14 17	2842	23 47 50	2769	25 22 58	2710	26 59 25	2661
	Jupiter	E.	44 37 49	2277	42 51 16	2276	41 4 42	2276	39 18 8	2277
	Spica	E.	70 21 0	2309	68 35 13	2309	66 49 27	2310	65 3 42	2310
11	Sun	W.	95 17 39	2611	96 56 19	2612	98 34 57	2613	100 13 34	2614
	Saturn	W.	50 30 34	2341	52 15 34	2341	54 0 34	2341	55 45 34	2342
	Pollux	W.	35 14 48	2516	36 55 39	2499	38 36 54	2484	40 18 30	2471
	Jupiter	E.	30 25 25	2279	28 38 54	2280	26 52 25	2281	25 5 57	2282
	Spica	E.	56 15 10	2316	54 29 34	2317	52 44 0	2320	50 58 29	2322
	Antares	E.	102 1 52	2353	100 17 9	2353	98 32 27	2353	96 47 45	2354
12	Sun	W.	108 26 11	2623	110 4 35	2625	111 42 56	2628	113 21 13	2631
	Saturn	W.	64 30 22	2346	66 15 15	2347	68 0 6	2348	69 44 55	2350
	Pollux	W.	48 50 12	2431	50 33 3	2426	52 16 0	2422	53 59 3	2419
	Spica	E.	42 11 59	2340	40 26 58	2344	38 42 3	2350	36 57 16	2356
	Antares	E.	88 4 33	2360	86 20 1	2362	84 35 32	2364	82 51 6	2367
13	Sun	W.	121 31 35	2648	123 9 25	2652	124 47 9	2657	126 24 47	2662

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Name and Direction of Object.		Noon.	P. L. of Diff.	IIIh.	P. L. of Diff.	VIh.	P. L. of Diff.	IXh.	P. L. of Diff.
13	Saturn	W.	78° 28′ 12″	2363	80° 12′ 40″	2366	81° 57′ 4″	2369	83° 41′ 23″	2373
	Pollux	W.	62 35 8	2413	64 18 24	2413	66 1 40	2414	67 44 55	2415
	Regulus	W.	25 53 41	2328	27 38 59	2331	29 24 14	2333	31 9 26	2336
	Antares	E.	74 10 1	2384	72 26 4	2389	70 42 14	2394	68 58 30	2399
14	Saturn	W.	92 21 33	2394	94 5 16	2399	95 48 52	2405	97 32 20	2410
	Pollux	W.	76 20 28	2429	78 3 22	2432	79 46 11	2436	81 28 54	2441
	Regulus	W.	39 54 14	2354	41 38 55	2358	43 23 30	2363	45 7 58	2368
	Mars	W.	28 6 4	2446	29 48 33	2450	31 30 56	2455	33 13 13	2460
	Antares	E.	60 21 56	2431	58 39 6	2440	56 56 28	2448	55 14 2	2456
15	Regulus	W.	53 48 19	2398	55 31 57	2404	57 15 26	2411	58 58 45	2419
	Mars	W.	41 42 45	2489	43 24 14	2496	45 5 33	2503	46 46 42	2510
	Jupiter	W.	25 55 5	2387	27 38 58	2394	29 22 41	2401	31 6 14	2409
	Antares	E.	46 45 24	2514	45 4 30	2528	43 23 56	2544	41 43 44	2561
	α Aquilæ	E.	95 33 3	2853	93 59 44	2858	92 26 31	2863	90 53 25	2869
16	Regulus	W.	67 32 40	2458	69 14 53	2466	70 56 54	2475	72 38 42	2485
	Mars	W.	55 9 45	2551	56 49 47	2561	58 29 36	2570	60 9 12	2580
	Jupiter	W.	39 41 14	2449	41 23 39	2458	43 5 52	2467	44 47 52	2476
	α Aquilæ	E.	83 10 33	2920	81 38 39	2932	80 7 1	2946	78 35 40	2962
17	Regulus	W.	81 4 25	2533	82 44 52	2543	84 25 5	2554	86 5 3	2565
	Mars	W.	68 23 52	2631	70 2 5	2641	71 40 4	2652	73 17 48	2663
	Jupiter	W.	53 14 31	2525	54 55 9	2536	56 35 32	2547	58 15 40	2558
	Spica	W.	27 51 7	2610	29 29 48	2612	31 8 26	2616	32 46 59	2621
	α Aquilæ	E.	71 4 8	3053	69 35 1	3074	68 6 20	3096	66 38 8	3123
18	Regulus	W.	94 21 7	2621	95 59 33	2633	97 37 43	2644	99 15 38	2656
	Mars	W.	81 22 37	2722	82 58 47	2735	84 34 41	2747	86 10 19	2759
	Jupiter	W.	66 32 32	2615	68 11 7	2626	69 49 27	2638	71 27 31	2650
	Spica	W.	40 57 33	2660	42 35 7	2669	44 12 29	2678	45 49 38	2689
	α Aquilæ	E.	59 25 14	3271	58 0 29	3307	56 36 26	3345	55 13 7	3386
19	Jupiter	W.	79 33 44	2710	81 10 10	2722	82 46 20	2735	84 22 13	2747
	Spica	W.	53 51 56	2741	55 27 41	2753	57 3 11	2764	58 38 26	2775
	α Aquilæ	E.	48 29 2	3635	47 11 5	3696	45 54 14	3763	44 38 33	3835
	Fomalhaut	E.	79 21 25	3057	77 52 23	3073	76 23 40	3089	74 55 17	3106
	α Pegasi	E.	94 8 18	2989	92 37 51	3000	91 7 38	3012	89 37 40	3024
20	Jupiter	W.	92 17 39	2808	93 51 57	2820	95 25 59	2831	96 59 46	2843
	Spica	W.	66 31 1	2832	68 4 47	2843	69 38 19	2855	71 11 36	2866
	Antares	W.	22 21 1	3243	23 46 19	3204	25 12 24	3173	26 39 6	3149
	Fomalhaut	E.	67 38 53	3203	66 12 47	3225	64 47 7	3247	63 21 53	3269
	α Pegasi	E.	82 11 45	3091	80 43 24	3105	79 15 20	3119	77 47 34	3135
21	Spica	W.	78 54 32	2920	80 26 26	2930	81 58 7	2939	83 29 36	2949
	Antares	W.	33 57 46	3095	35 26 2	3091	36 54 23	3088	38 22 47	3087
	Fomalhaut	E.	56 22 41	3398	55 0 22	3428	53 38 37	3458	52 17 26	3491
	α Pegasi	E.	70 33 24	3214	69 7 32	3231	67 42 0	3248	66 16 48	3265
	Venus	E.	94 41 22	3297	93 17 7	3309	91 53 6	3320	90 29 18	3331
	Sun	E.	139 8 41	3291	137 44 19	3300	136 20 8	3309	134 56 7	3319

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Name and Direction of Object.		Midnight.	P. L. of Diff.	XVh.	P. L. of Diff.	XVIIIh.	P. L. of Diff.	XXIh.	P. L. of Diff.
13	Saturn	W.	85° 25′ 36″	2377	87° 9′ 44″	2380	88° 53′ 47″	2385	90° 37′ 43″	2389
	Pollux	W.	69 28 8	2417	71 11 18	2419	72 54 25	2422	74 37 29	2426
	Regulus	W.	32 54 33	2339	34 39 36	2346	36 24 34	2346	38 9 27	2350
	Antares	E.	67 14 54	2405	65 31 26	2410	63 48 6	2417	62 4 56	2424
14	Saturn	W.	99 15 41	2415	100 58 54	2421	102 41 58	2428	104 24 53	2434
	Pollux	W.	83 11 30	2446	84 53 59	2451	86 36 21	2458	88 18 34	2463
	Regulus	W.	46 52 18	2373	48 36 31	2379	50 20 36	2385	52 4 32	2391
	Mars	W.	34 55 23	2465	36 37 26	2470	38 19 21	2477	40 1 7	2482
	Antares	E.	53 31 49	2467	51 49 50	2477	50 8 5	2488	48 26 36	2501
15	Regulus	W.	60 41 53	2426	62 24 51	2433	64 7 39	2441	65 50 15	2449
	Mars	W.	48 27 41	2518	50 8 29	2526	51 49 6	2535	53 29 31	2543
	Jupiter	W.	32 49 36	2416	34 32 48	2424	36 15 48	2432	37 58 37	2441
	Antares	E.	40 3 55	2579	38 24 31	2599	36 45 34	2620	35 7 6	2644
	α Aquilæ	E.	89 20 27	2878	87 47 40	2887	86 15 5	2897	84 42 42	2906
16	Regulus	W.	74 20 17	2494	76 1 39	2503	77 42 48	2513	79 23 43	2522
	Mars	W.	61 48 35	2589	63 27 45	2599	65 6 41	2609	66 45 24	2620
	Jupiter	W.	46 29 39	2485	48 11 13	2495	49 52 33	2505	51 33 39	2515
	α Aquilæ	E.	77 4 39	2977	75 33 58	2994	74 3 38	3013	72 33 41	3032
17	Regulus	W.	87 44 46	2576	89 24 14	2587	91 3 27	2598	92 42 25	2610
	Mars	W.	74 55 17	2675	76 32 31	2687	78 9 29	2698	79 46 11	2710
	Jupiter	W.	59 55 33	2569	61 35 11	2580	63 14 34	2591	64 53 41	2603
	Spica	W.	34 25 25	2626	36 3 42	2635	37 41 50	2643	39 19 47	2651
	α Aquilæ	E.	65 10 26	3149	63 43 16	3177	62 16 39	3207	60 50 38	3236
18	Regulus	W.	100 53 17	2668	102 30 40	2681	104 7 46	2692	105 44 36	2704
	Mars	W.	87 45 41	2771	89 20 47	2784	90 55 36	2797	92 30 8	2810
	Jupiter	W.	73 5 18	2662	74 42 49	2674	76 20 4	2687	77 57 2	2698
	Spica	W.	47 26 33	2698	49 3 15	2709	50 39 43	2719	52 15 57	2731
	α Aquilæ	E.	53 50 34	3430	52 28 50	3475	51 7 58	3525	49 48 1	3577
19	Jupiter	W.	85 57 50	2760	87 33 11	2772	89 8 16	2784	90 43 5	2795
	Spica	W.	60 13 27	2786	61 48 13	2798	63 22 44	2809	64 57 0	2821
	α Aquilæ	E.	43 24 7	3914	42 11 1	4000	40 59 21	4092	39 49 12	4196
	Fomalhaut	E.	73 27 15	3124	71 59 35	3143	70 32 18	3163	69 5 24	3182
	α Pegasi	E.	88 7 57	3036	86 38 29	3050	85 9 18	3063	83 40 23	3077
20	Jupiter	W.	98 33 19	2854	100 6 37	2866	101 39 40	2877	103 12 28	2888
	Spica	W.	72 44 39	2876	74 17 28	2887	75 50 3	2898	77 22 24	2909
	Antares	W.	28 6 16	3132	29 33 47	3118	31 1 35	3107	32 29 36	3100
	Fomalhaut	E.	61 57 5	3293	60 32 45	3318	59 8 54	3343	57 45 32	3370
	α Pegasi	E.	76 20 7	3150	74 52 58	3165	73 26 7	3182	71 59 36	3198
21	Spica	W.	85 0 53	2959	86 31 57	2969	88 2 49	2977	89 33 30	2986
	Antares	W.	39 51 12	3087	41 19 37	3089	42 48 0	3090	44 16 22	3091
	Fomalhaut	E.	50 56 52	3525	49 36 56	3562	48 17 40	3600	46 59 6	3642
	α Pegasi	E.	64 51 56	3284	63 27 26	3303	62 3 18	3322	60 39 32	3343
	Venus	E.	89 5 42	3342	87 42 19	3352	86 19 8	3363	84 56 9	3372
	Sun	E.	133 32 17	3327	132 8 37	3337	130 45 8	3346	129 21 50	3355

AT GREENWICH APPARENT NOON.

Day of the Week.	Day of the Month.	THE SUN'S Apparent Right Ascension.	Diff. for 1 Hour.	Apparent Declination.	Diff. for 1 Hour.	Semi-diameter.	Sidereal Time of Semi-diameter Passing Meridian.	Equation of Time, to be Subtracted from / Added to Apparent Time.	Diff. for 1 Hour.
		h m s	s	° ′ ″	″	′ ″	s	m s	s
Tues.	1	4 37 7.03	10.237	N.22 5 3.7	+20.23	15 48.30	68.42	2 26.84	0.380
Wed.	2	4 41 12.94	10.253	22 12 57.9	19.26	15 48.17	68.47	2 17.53	0.396
Thur.	3	4 45 19.21	10.269	22 20 28.9	18.29	15 48.04	68.53	2 7.85	0.412
Frid.	4	4 49 25.84	10.283	22 27 36.3	+17.31	15 47.92	68.58	1 57.80	0.426
Sat.	5	4 53 32.82	10.297	22 34 20.2	16.33	15 47.80	68.63	1 47.40	0.440
SUN.	6	4 57 40.12	10.310	22 40 40.5	15.34	15 47.69	68.68	1 36.69	0.453
Mon.	7	5 1 47.71	10.322	22 46 36.9	+14.35	15 47.58	68 72	1 25.69	0.465
Tues.	8	5 5 55.57	10.333	22 52 9.4	13.35	15 47.48	68.76	1 14.42	0.476
Wed.	9	5 10 3.67	10.343	22 57 17.7	12.34	15 47.38	68.79	1 2.90	0.486
Thur.	10	5 14 12.00	10.352	23 2 1.8	+11.33	15 47.29	68.82	0 51.16	0.495
Frid.	11	5 18 20.55	10.360	23 6 21.5	10.31	15 47.20	68.85	0 39.20	0.503
Sat.	12	5 22 29.28	10.367	23 10 16.8	9.29	15 47.11	68.88	0 27.06	0.510
SUN.	13	5 26 38.18	10.373	23 13 47.6	+ 8.27	15 47.03	68.90	0 14.75	0.516
Mon.	14	5 30 47.22	10.379	23 16 53.8	7.24	15 46.95	68.92	0 2.30	0.522
Tues.	15	5 34 56.39	10.384	23 19 35.3	6.21	15 46.87	68.93	0 10.29	0.527
Wed.	16	5 39 5.68	10.388	23 21 52.2	+ 5.19	15 46.80	68.95	0 22.99	0.531
Thur.	17	5 43 15.07	10.392	23 23 44.3	4.16	15 46.73	68.96	0 35.79	0.535
Frid.	18	5 47 24.51	10.394	23 25 11.7	3.13	15 46.66	68.97	0 48.64	0.537
Sat.	19	5 51 34.01	10.396	23 26 14.3	+ 2.09	15 46.60	68.98	1 1.54	0.539
SUN.	20	5 55 43.54	10.397	23 26 52.1	1.06	15 46.54	68.98	1 14.47	0.540
Mon.	21	5 59 53.08	10.397	23 27 5.1	+ 0.02	15 46.48	68.98	1 27.42	0.540
Tues.	22	6 4 2.62	10.397	23 26 53.3	− 1.01	15 46.43	68.98	1 40.36	0.540
Wed.	23	6 8 12.12	10.395	23 26 16.6	2.04	15 46.38	68.97	1 53.26	0.538
Thur.	24	6 12 21.57	10.392	23 25 15.2	3.07	15 46.33	68.96	2 6.11	0.535
Frid.	25	6 16 30.94	10.388	23 23 49.0	− 4.10	15 46.29	68.94	2 18.90	0.531
Sat.	26	6 20 40.21	10.383	23 21 58.3	5.13	15 46.25	68.92	2 31.58	0.526
SUN.	27	6 24 49.35	10.377	23 19 42.9	6.15	15 46.22	68.90	2 44.13	0.520
Mon.	28	6 28 58.34	10.370	23 17 2.9	− 7.17	15 46.19	68.87	2 56.53	0.513
Tues.	29	6 33 7.15	10.363	23 13 58.3	8.19	15 46.17	68.84	3 8.76	0.506
Wed.	30	6 37 15.77	10.354	23 10 29.3	9.21	15 46.16	68.81	3 20.78	0.497
Thur.	31	6 41 24,15	10.344	N. 23 6 36.0	−10.22	15 46.15	68.78	3 32.58	0.487

NOTE.—The mean time of semidiameter passing may be found by subtracting 0s.19 from the sidereal time.
The sign + prefixed to the hourly change of declination indicates that north declinations are increasing; the sign − indicates that north declinations are decreasing.

GREENWICH MEAN TIME.

THE MOON'S RIGHT ASCENSION AND DECLINATION.

TUESDAY 1.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
	h m s	s	° ′ ″	″
0	3 42 49.43	2.3131	N.14 44 54.7	6.949
1	3 45 8.36	2.3179	14 51 49.3	6.871
2	3 47 27.58	2.3226	14 58 39.2	6.791
3	3 49 47.10	2.3277	15 5 24.2	6.709
4	3 52 6.90	2.3324	15 12 4.3	6.627
5	3 54 26.99	2.3372	15 18 39.4	6.543
6	3 56 47.36	2.3419	15 25 9.5	6.459
7	3 59 8.02	2.3467	15 31 34.5	6.373
8	4 1 28.96	2.3514	15 37 54.3	6.286
9	4 3 50.19	2.3561	15 44 8.8	6.198
10	4 6 11.70	2.3608	15 50 18.1	6.110
11	4 8 33.49	2.3655	15 56 22.0	6.020
12	4 10 55.56	2.3701	16 2 20.5	5.929
13	4 13 17.90	2.3747	16 8 13.5	5.837
14	4 15 40.52	2.3793	16 14 0.9	5.743
15	4 18 3.41	2.3838	16 19 42.7	5.649
16	4 20 26.57	2.3883	16 25 18.8	5.554
17	4 22 50.00	2.3927	16 30 49.2	5.458
18	4 25 13.69	2.3970	16 36 13.8	5.361
19	4 27 37.64	2.4014	16 41 32.5	5.262
20	4 30 1.86	2.4058	16 46 45.3	5.163
21	4 32 26.34	2.4101	16 51 52.1	5.063
22	4 34 51.07	2.4143	16 56 52.8	4.962
23	4 37 16.05	2.4185	N.17 1 47.5	4.860

WEDNESDAY 2.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
0	4 39 41.29	2.4227	N.17 6 36.0	4.757
1	4 42 6.77	2.4267	17 11 18.3	4.652
2	4 44 32.49	2.4307	17 15 54.3	4.547
3	4 46 58.45	2.4347	17 20 24.0	4.442
4	4 49 24.65	2.4387	17 24 47.4	4.336
5	4 51 51.09	2.4426	17 29 4.3	4.228
6	4 54 17.76	2.4463	17 33 14.7	4.119
7	4 56 44.65	2.4500	17 37 18.6	4.010
8	4 59 11.76	2.4537	17 41 15.9	3.899
9	5 1 39.09	2.4573	17 45 6.5	3.788
10	5 4 6.64	2.4610	17 48 50.4	3.676
11	5 6 34.41	2.4645	17 52 27.6	3.564
12	5 9 2.38	2.4679	17 55 58.1	3.451
13	5 11 30.55	2.4712	17 59 21.7	3.336
14	5 13 58.92	2.4745	18 2 38.4	3.221
15	5 16 27.49	2.4777	18 5 48.2	3.106
16	5 18 56.25	2.4808	18 8 51.1	2.989
17	5 21 25.19	2.4838	18 11 46.9	2.872
18	5 23 54.31	2.4868	18 14 35.7	2.754
19	5 26 23.61	2.4897	18 17 17.4	2.636
20	5 28 53.08	2.4926	18 19 52.0	2.517
21	5 31 22.72	2.4954	18 22 19.4	2.397
22	5 33 52.53	2.4981	18 24 39.6	2.277
23	5 36 22.49	2.5006	18 26 52.6	2.157
24	5 38 52.60	2.5031	N.18 28 58.4	2.036

THURSDAY 3.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
	h m s	s	° ′ ″	″
0	5 38 52.60	2.5031	N.18 28 58.4	2.036
1	5 41 22.86	2.5055	18 30 56.9	1.913
2	5 43 53.26	2.5078	18 32 48.0	1.790
3	5 46 23.80	2.5101	18 34 31.7	1.667
4	5 48 54.48	2.5124	18 36 8.0	1.543
5	5 51 25.29	2.5145	18 37 36.9	1.420
6	5 53 56.22	2.5165	18 38 58.4	1.296
7	5 56 27.27	2.5184	18 40 12.4	1.171
8	5 58 58.43	2.5202	18 41 18.9	1.046
9	6 1 29.69	2.5219	18 42 17.9	0.921
10	6 4 1.05	2.5235	18 43 9.4	0.796
11	6 6 32.51	2.5251	18 43 53.4	0.670
12	6 9 4.06	2.5265	18 44 29.8	0.543
13	6 11 35.69	2.5278	18 44 58.6	0.416
14	6 14 7.40	2.5291	18 45 19.8	0.289
15	6 16 39.19	2.5304	18 45 33.3	0.162
16	6 19 11.05	2.5315	18 45 39.2	+ 0.035
17	6 21 42.97	2.5325	18 45 37.5	− 0.092
18	6 24 14.95	2.5334	18 45 28.1	0.220
19	6 26 46.98	2.5342	18 45 11.1	0.347
20	6 29 19.05	2.5349	18 44 46.4	0.475
21	6 31 51.16	2.5355	18 44 14.1	0.603
22	6 34 23.31	2.5361	18 43 34.1	0.731
23	6 36 55.49	2.5365	N.18 42 46.4	0.859

FRIDAY 4.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
0	6 39 27.69	2.5368	N.18 41 51.0	0.987
1	6 41 59.91	2.5371	18 40 48.0	1.114
2	6 44 32.14	2.5372	18 39 37.3	1.242
3	6 47 4.37	2.5373	18 38 18.9	1.370
4	6 49 36.61	2.5373	18 36 52.9	1.497
5	6 52 8.84	2.5372	18 35 19.2	1.625
6	6 54 41.07	2.5370	18 33 37.9	1.752
7	6 57 13.28	2.5367	18 31 49.0	1.879
8	6 59 45.47	2.5362	18 29 52.5	2.006
9	7 2 17.63	2.5357	18 27 48.3	2.132
10	7 4 49.76	2.5352	18 25 36.6	2.258
11	7 7 21.86	2.5346	18 23 17.3	2.385
12	7 9 53.91	2.5338	18 20 50.4	2.511
13	7 12 25.91	2.5329	18 18 16.0	2.636
14	7 14 57.86	2.5320	18 15 34.1	2.761
15	7 17 29.75	2.5310	18 12 44.7	2.886
16	7 20 1.58	2.5300	18 9 47.8	3.010
17	7 22 33.35	2.5289	18 6 43.5	3.134
18	7 25 5.05	2.5277	18 3 31.7	3.257
19	7 27 36.67	2.5263	18 0 12.6	3.380
20	7 30 8.20	2.5248	17 56 46.1	3.503
21	7 32 39.64	2.5233	17 53 12.3	3.624
22	7 35 10.99	2.5217	17 49 31.2	3.746
23	7 37 42.24	2.5200	17 45 42.8	3.867
24	7 40 13.39	2.5183	N.17 41 47.1	3.988

GREENWICH MEAN TIME.

THE MOON'S RIGHT ASCENSION AND DECLINATION.

SATURDAY 5.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
	h m s	s	° ′ ″	″
0	7 40 13.39	2.5183	N.17 41 47.1	3.988
1	7 42 44.44	2.5165	17 37 44.2	4.107
2	7 45 15.37	2.5146	17 33 34.2	4.226
3	7 47 46.19	2.5127	17 29 17.1	4.344
4	7 50 16.89	2.5107	17 24 52.9	4.462
5	7 52 47.47	2.5087	17 20 21.6	4.580
6	7 55 17.93	2.5065	17 15 43.3	4.697
7	7 57 48.25	2.5043	17 10 58.0	4.812
8	8 0 18.44	2.5020	17 6 5.8	4.927
9	8 2 48.49	2.4997	17 1 6.8	5.041
10	8 5 18.40	2.4973	16 56 0.9	5.154
11	8 7 48.16	2.4948	16 50 48.3	5.267
12	8 10 17.78	2.4923	16 45 28.9	5.379
13	8 12 47.24	2.4897	16 40 2.8	5.490
14	8 15 16.54	2.4870	16 34 30.1	5.600
15	8 17 45.68	2.4843	16 28 50.8	5.710
16	8 20 14.66	2.4816	16 23 4.9	5.818
17	8 22 43.48	2.4789	16 17 12.6	5.926
18	8 25 12.13	2.4760	16 11 13.8	6.033
19	8 27 40.60	2.4731	16 5 8.6	6.139
20	8 30 8.90	2.4702	15 58 57.1	6.243
21	8 32 37.02	2.4672	15 52 39.4	6.347
22	8 35 4.96	2.4642	15 46 15.5	6.450
23	8 37 32.72	2.4612	N.15 39 45.4	6.553

SUNDAY 6.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
0	8 40 0.30	2.4581	N.15 33 9.1	6.655
1	8 42 27.69	2.4549	15 26 26.8	6.754
2	8 44 54.89	2.4517	15 19 38.6	6.853
3	8 47 21.89	2.4484	15 12 44.5	6.951
4	8 49 48.70	2.4453	15 5 44.5	7.048
5	8 52 15.32	2.4421	14 58 38.7	7.144
6	8 54 41.75	2.4388	14 51 27.2	7.238
7	8 57 7.98	2.4354	14 44 10.1	7.332
8	8 59 34.00	2.4320	14 36 47.3	7.426
9	9 1 59.82	2.4287	14 29 18.9	7.519
10	9 4 25.44	2.4253	14 21 45.0	7.609
11	9 6 50.85	2.4218	14 14 5.8	7.698
12	9 9 16.06	2.4184	14 6 21.3	7.786
13	9 11 41.06	2.4149	13 58 31.5	7.874
14	9 14 5.85	2.4114	13 50 36.4	7.961
15	9 16 30.43	2.4080	13 42 36.2	8.046
16	9 18 54.81	2.4046	13 34 30.9	8.130
17	9 21 18.98	2.4011	13 26 20.6	8.212
18	9 23 42.94	2.3976	13 18 5.4	8.294
19	9 26 6.69	2.3940	13 9 45.3	8.375
20	9 28 30.22	2.3904	13 1 20.4	8.455
21	9 30 53.54	2.3869	12 52 50.7	8.534
22	9 33 16.65	2.3833	12 44 16.3	8.612
23	9 35 39.54	2.3797	12 35 37.3	8.688
24	9 38 2.22	2.3762	N.12 26 53.8	8.762

MONDAY 7.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
	h m s	s	° ′ ″	″
0	9 38 2.22	2.3762	N.12 26 53.8	8.762
1	9 40 24.69	2.3727	12 18 5.9	8.836
2	9 42 46.95	2.3692	12 9 13.5	8.909
3	9 45 8.99	2.3656	12 0 16.8	8.981
4	9 47 30.82	2.3621	11 51 15.8	9.051
5	9 49 52.44	2.3586	11 42 10.7	9.119
6	9 52 13.85	2.3551	11 33 1.5	9.187
7	9 54 35.05	2.3516	11 23 48.2	9.254
8	9 56 56.04	2.3480	11 14 31.0	9.319
9	9 59 16.81	2.3444	11 5 9.9	9.384
10	10 1 37.37	2.3410	10 55 44.9	9.447
11	10 3 57.73	2.3376	10 46 16.2	9.509
12	10 6 17.88	2.3341	10 36 43.8	9.570
13	10 8 37.82	2.3307	10 27 7.8	9.630
14	10 10 57.56	2.3272	10 17 28.2	9.688
15	10 13 17.09	2.3238	10 7 45.2	9.745
16	10 15 36.42	2.3205	9 57 58.8	9.802
17	10 17 55.55	2.3171	9 48 9.0	9.858
18	10 20 14.47	2.3137	9 38 15.9	9.912
19	10 22 33.20	2.3105	9 28 19.6	9.963
20	10 24 51.73	2.3072	9 18 20.3	10.014
21	10 27 10.06	2.3039	9 8 17.9	10.065
22	10 29 28.19	2.3006	8 58 12.5	10.114
23	10 31 46.13	2.2974	N. 8 48 4.2	10.162

TUESDAY 8.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
0	10 34 3.88	2.2942	N. 8 37 53.1	10.208
1	10 36 21.44	2.2911	8 27 39.2	10.254
2	10 38 38.81	2.2879	8 17 22.6	10.298
3	10 40 55.99	2.2848	8 7 3.4	10.342
4	10 43 12.98	2.2817	7 56 41.6	10.383
5	10 45 29.79	2.2787	7 46 17.4	10.423
6	10 47 46.42	2.2757	7 35 50.8	10.463
7	10 50 2.87	2.2727	7 25 21.8	10.502
8	10 52 19.14	2.2697	7 14 50.5	10.539
9	10 54 35.23	2.2668	7 4 17.1	10.574
10	10 56 51.15	2.2639	6 53 41.6	10.610
11	10 59 6.90	2.2611	6 43 3.9	10.645
12	11 1 22.48	2.2583	6 32 24.2	10.677
13	11 3 37.89	2.2555	6 21 42.6	10.708
14	11 5 53.14	2.2527	6 10 59.2	10.739
15	11 8 8.22	2.2500	6 0 13.9	10.769
16	11 10 23.14	2.2474	5 49 26.9	10.797
17	11 12 37.91	2.2448	5 38 38.3	10.823
18	11 14 52.52	2.2422	5 27 48.1	10.849
19	11 17 6.98	2.2397	5 16 56.4	10.874
20	11 19 21.28	2.2371	5 6 3.2	10.898
21	11 21 35.43	2.2347	4 55 8.6	10.921
22	11 23 49.44	2.2322	4 44 12.7	10.942
23	11 26 3.31	2.2299	4 33 15.6	10.962
24	11 28 17.03	2.2275	N. 4 22 17.3	10.982

GREENWICH MEAN TIME.

THE MOON'S RIGHT ASCENSION AND DECLINATION.

WEDNESDAY 9.

Hour.	Right Ascension. h m s	Diff. for 1 Minute. s	Declination. ° ′ ″	Diff. for 1 Minute. ″
0	11 28 17.03	2.2275	N. 4 22 17.3	10.981
1	11 30 30.61	2.2252	4 11 17.9	10.999
2	11 32 44.06	2.2230	4 0 17.4	11.017
3	11 34 57.37	2.2208	3 49 15.9	11.033
4	11 37 10.55	2.2186	3 38 13.5	11.047
5	11 39 23.60	2.2165	3 27 10.3	11.061
6	11 41 36.53	2.2144	3 16 6.2	11.074
7	11 43 49.33	2.2123	3 5 1.4	11.085
8	11 46 2.01	2.2103	2 53 56.0	11.095
9	11 48 14.57	2.2083	2 42 50.0	11.104
10	11 50 27.01	2.2064	2 31 43.5	11.112
11	11 52 39.34	2.2046	2 20 36.5	11.120
12	11 54 51.56	2.2028	2 9 29.1	11.127
13	11 57 3.67	2.2010	1 58 21.3	11.132
14	11 59 15.68	2.1992	1 47 13.3	11.135
15	12 1 27.58	2.1975	1 36 5.1	11.137
16	12 3 39.38	2.1958	1 24 56.8	11.140
17	12 5 51.08	2.1942	1 13 48.3	11.142
18	12 8 2.69	2.1927	1 2 39.8	11.141
19	12 10 14.21	2.1912	0 51 31.4	11.140
20	12 12 25.64	2.1897	0 40 23.0	11.138
21	12 14 36.98	2.1883	0 29 14.8	11.135
22	12 16 48.24	2.1869	0 18 6.8	11.131
23	12 18 59.41	2.1855	N. 0 6 59.1	11.125

THURSDAY 10.

Hour.	Right Ascension. h m s	Diff. for 1 Minute. s	Declination. ° ′ ″	Diff. for 1 Minute. ″
0	12 21 10.50	2.1843	S. 0 4 8.2	11.118
1	12 23 21.52	2.1831	0 15 15.1	11.111
2	12 25 32.47	2.1818	0 26 21.6	11.103
3	12 27 43.34	2.1806	0 37 27.5	11.093
4	12 29 54.14	2.1795	0 48 32.8	11.083
5	12 32 4.88	2.1785	0 59 37.5	11.072
6	12 34 15.56	2.1775	1 10 41.5	11.060
7	12 36 26.18	2.1765	1 21 44.7	11.047
8	12 38 36.74	2.1755	1 32 47.0	11.032
9	12 40 47.24	2.1746	1 43 48.5	11.017
10	12 42 57.69	2.1737	1 54 49.1	11.001
11	12 45 8.09	2.1729	2 5 48.6	10.983
12	12 47 18.44	2.1722	2 16 47.0	10.964
13	12 49 28.75	2.1715	2 27 44.3	10.946
14	12 51 39.02	2.1708	2 38 40.5	10.926
15	12 53 49.24	2.1701	2 49 35.4	10.904
16	12 55 59.43	2.1695	3 0 29.0	10.882
17	12 58 9.58	2.1688	3 11 21.3	10.860
18	13 0 19.69	2.1683	3 22 12.2	10.836
19	13 2 29.77	2.1678	3 33 1.6	10.811
20	13 4 39.83	2.1674	3 43 49.5	10.785
21	13 6 49.86	2.1670	3 54 35.8	10.758
22	13 8 59.87	2.1667	4 5 20.5	10.731
23	13 11 9.86	2.1663	4 16 3.5	10.702
24	13 13 19.83	2.1660	S. 4 26 44.7	10.672

FRIDAY 11.

Hour.	Right Ascension. h m s	Diff. for 1 Minute. s	Declination. ° ′ ″	Diff. for 1 Minute. ″
0	13 13 19.83	2.1660	S. 4 26 44.7	10.672
1	13 15 29.78	2.1658	4 37 24.1	10.642
2	13 17 39.72	2.1656	4 48 1.7	10.610
3	13 19 49.65	2.1653	4 58 37.3	10.578
4	13 21 59.56	2.1652	5 9 11.0	10.545
5	13 24 9.47	2.1651	5 19 42.7	10.511
6	13 26 19.37	2.1649	5 30 12.3	10.476
7	13 28 29.26	2.1649	5 40 39.8	10.440
8	13 30 39.16	2.1650	5 51 5.1	10.403
9	13 32 49.06	2.1650	6 1 28.1	10.365
10	13 34 58.96	2.1651	6 11 48.9	10.327
11	13 37 8.87	2.1652	6 22 7.3	10.287
12	13 39 18.78	2.1653	6 32 23.3	10.247
13	13 41 28.70	2.1654	6 42 36.9	10.205
14	13 43 38.63	2.1656	6 52 47.9	10.163
15	13 45 48.57	2.1658	7 2 56.4	10.120
16	13 47 58.53	2.1661	7 13 2.3	10.076
17	13 50 8.50	2.1663	7 23 5.5	10.032
18	13 52 18.48	2.1665	7 33 6.1	9.986
19	13 54 28.48	2.1669	7 43 3.9	9.939
20	13 56 38.51	2.1673	7 52 58.8	9.892
21	13 58 48.56	2.1677	8 2 50.9	9.844
22	14 0 58.63	2.1681	8 12 40.1	9.795
23	14 3 8.73	2.1685	S. 8 22 26.3	9.746

SATURDAY 12.

Hour.	Right Ascension. h m s	Diff. for 1 Minute. s	Declination. ° ′ ″	Diff. for 1 Minute. ″
0	14 5 18.85	2.1690	S. 8 32 9.6	9.696
1	14 7 29.00	2.1694	8 41 49.8	9.644
2	14 9 39.18	2.1700	8 51 26.8	9.591
3	14 11 49.40	2.1706	9 1 0.7	9.538
4	14 13 59.65	2.1711	9 10 31.4	9.484
5	14 16 9.93	2.1716	9 19 58.8	9.430
6	14 18 20.24	2.1722	9 29 23.0	9.375
7	14 20 30.59	2.1728	9 38 43.8	9.318
8	14 22 40.98	2.1734	9 48 1.2	9.261
9	14 24 51.40	2.1740	9 57 15.1	9.203
10	14 27 1.86	2.1747	10 6 25.5	9.144
11	14 29 12.37	2.1755	10 15 32.4	9.085
12	14 31 22.92	2.1762	10 24 35.7	9.024
13	14 33 33.51	2.1769	10 33 35.3	8.963
14	14 35 44.14	2.1776	10 42 31.3	8.902
15	14 37 54.82	2.1783	10 51 23.6	8.840
16	14 40 5.54	2.1791	11 0 12.1	8.777
17	14 42 16.31	2.1798	11 8 56.8	8.713
18	14 44 27.12	2.1806	11 17 37.7	8.649
19	14 46 37.98	2.1814	11 26 14.7	8.583
20	14 48 48.89	2.1821	11 34 47.7	8.517
21	14 50 59.84	2.1829	11 43 16.7	8.449
22	14 53 10.84	2.1837	11 51 41.6	8.382
23	14 55 21.89	2.1847	12 0 2.5	8.314
24	14 57 33.00	2.1856	S. 12 8 19.3	8.245

GREENWICH MEAN TIME.

THE MOON'S RIGHT ASCENSION AND DECLINATION.

THURSDAY 17.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
	h m s	s	° ′ ″	″
0	18 29 12.36	2.1813	S. 18 47 12.7	0.344
1	18 31 23.19	2.1796	18 46 49.2	0.439
2	18 33 33.91	2.1778	18 46 20.0	0.533
3	18 35 44.53	2.1762	18 45 45.2	0.627
4	18 37 55.05	2.1744	18 45 4.8	0.720
5	18 40 5.46	2.1726	18 44 18.8	0.813
6	18 42 15.76	2.1707	18 43 27.2	0.907
7	18 44 25.95	2.1689	18 42 30.0	0.999
8	18 46 36.03	2.1671	18 41 27.3	1.091
9	18 48 46.00	2.1652	18 40 19.1	1.183
10	18 50 55.85	2.1632	18 39 5.3	1.275
11	18 53 5.58	2.1612	18 37 46.1	1.366
12	18 55 15.19	2.1592	18 36 21.4	1.457
13	18 57 24.68	2.1572	18 34 51.2	1.548
14	18 59 34.05	2.1551	18 33 15.6	1.638
15	19 1 43.29	2.1529	18 31 34.6	1.728
16	19 3 52.40	2.1508	18 29 48.2	1.818
17	19 6 1.39	2.1487	18 27 56.4	1.907
18	19 8 10.25	2.1465	18 25 59.3	1.997
19	19 10 18.97	2.1443	18 23 56.8	2.086
20	19 12 27.56	2.1421	18 21 49.0	2.173
21	19 14 36.02	2.1398	18 19 36.0	2.261
22	19 16 44.34	2.1375	18 17 17.7	2.348
23	19 18 52.52	2.1352	S. 18 14 54.2	2.436

FRIDAY 18.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
0	19 21 0.56	2.1328	S. 18 12 25.4	2.523
1	19 23 8.46	2.1305	18 9 51.4	2.609
2	19 25 16.22	2.1282	18 7 12.3	2.694
3	19 27 23.84	2.1258	18 4 28.1	2.779
4	19 29 31.31	2.1233	18 1 38.8	2.864
5	19 31 38.64	2.1209	17 58 44.4	2.949
6	19 33 45.82	2.1184	17 55 44.9	3.033
7	19 35 52.85	2.1159	17 52 40.4	3.117
8	19 37 59.73	2.1135	17 49 30.9	3.200
9	19 40 6.47	2.1111	17 46 16.4	3.282
10	19 42 13.06	2.1085	17 42 57.0	3.365
11	19 44 19.49	2.1058	17 39 32.6	3.447
12	19 46 25.76	2.1032	17 36 3.3	3.528
13	19 48 31.88	2.1007	17 32 29.2	3.609
14	19 50 37.85	2.0982	17 28 50.2	3.690
15	19 52 43.67	2.0957	17 25 6.4	3.769
16	19 54 49.33	2.0930	17 21 17.9	3.848
17	19 56 54.83	2.0904	17 17 24.6	3.927
18	19 59 0.18	2.0878	17 13 26.6	4.006
19	20 1 5.37	2.0852	17 9 23.9	4.084
20	20 3 10.40	2.0825	17 5 16.5	4.162
21	20 5 15.27	2.0798	17 1 4.5	4.238
22	20 7 19.98	2.0772	16 56 47.9	4.314
23	20 9 24.53	2.0746	16 52 26.8	4.390
24	20 11 28.93	2.0720	S. 16 48 1.1	4.466

SATURDAY 19.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
	h m s	s	° ′ ″	″
0	20 11 28.93	2.0720	S. 16 48 1.1	4.466
1	20 13 33.17	2.0693	16 43 30.9	4.541
2	20 15 37.24	2.0665	16 38 56.2	4.615
3	20 17 41.15	2.0638	16 34 17.1	4.689
4	20 19 44.90	2.0612	16 29 33.5	4.762
5	20 21 48.49	2.0586	16 24 45.6	4.835
6	20 23 51.93	2.0559	16 19 53.3	4.907
7	20 25 55.20	2.0532	16 14 56.7	4.979
8	20 27 58.31	2.0505	16 9 55.8	5.051
9	20 30 1.26	2.0478	16 4 50.6	5.123
10	20 32 4.05	2.0452	15 59 41.2	5.192
11	20 34 6.68	2.0425	15 54 27.6	5.261
12	20 36 9.15	2.0398	15 49 9.9	5.330
13	20 38 11.46	2.0372	15 43 48.0	5.399
14	20 40 13.61	2.0345	15 38 22.0	5.467
15	20 42 15.60	2.0318	15 32 52.0	5.534
16	20 44 17.43	2.0292	15 27 17.9	5.601
17	20 46 19.11	2.0266	15 21 39.9	5.667
18	20 48 20.63	2.0240	15 15 57.9	5.733
19	20 50 21.99	2.0213	15 10 11.9	5.799
20	20 52 23.19	2.0187	15 4 22.0	5.863
21	20 54 24.24	2.0162	14 58 28.3	5.927
22	20 56 25.13	2.0136	14 52 30.7	5.991
23	20 58 25.87	2.0111	S. 14 46 29.3	6.054

SUNDAY 20.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
0	21 0 26.46	2.0085	S. 14 40 24.2	6.117
1	21 2 26.89	2.0059	14 34 15.3	6.179
2	21 4 27.17	2.0034	14 28 2.7	6.241
3	21 6 27.30	2.0009	14 21 46.4	6.302
4	21 8 27.28	1.9984	14 15 26.5	6.362
5	21 10 27.11	1.9959	14 9 3.0	6.422
6	21 12 26.79	1.9935	14 2 35.9	6.481
7	21 14 26.33	1.9911	13 56 5.3	6.539
8	21 16 25.72	1.9886	13 49 31.2	6.596
9	21 18 24.96	1.9862	13 42 53.5	6.656
10	21 20 24.06	1.9838	13 36 12.4	6.713
11	21 22 23.02	1.9814	13 29 27.9	6.770
12	21 24 21.83	1.9790	13 22 40.0	6.826
13	21 26 20.50	1.9767	13 15 48.8	6.881
14	21 28 19.04	1.9745	13 8 54.3	6.937
15	21 30 17.44	1.9722	13 1 56.4	6.992
16	21 32 15.70	1.9699	12 54 55.3	7.045
17	21 34 13.83	1.9677	12 47 51.0	7.098
18	21 36 11.83	1.9656	12 40 43.5	7.151
19	21 38 9.70	1.9634	12 33 32.9	7.203
20	21 40 7.43	1.9612	12 26 19.2	7.254
21	21 42 5.03	1.9590	12 19 2.4	7.306
22	21 44 2.51	1.9569	12 11 42.5	7.357
23	21 45 59.86	1.9548	12 4 19.5	7.406
24	21 47 57.08	1.9527	S. 11 56 53.5	7.457

GREENWICH MEAN TIME.

THE MOON'S RIGHT ASCENSION AND DECLINATION.

MONDAY 21.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
	h m s	s	° ′ ″	″
0	21 47 57.08	1.9527	S. 11 56 53.5	7.457
1	21 49 54.18	1.9507	11 49 24.6	7.506
2	21 51 51.17	1.9488	11 41 52.8	7.554
3	21 53 48.04	1.9469	11 34 18.1	7.602
4	21 55 44.79	1.9448	11 26 40.5	7.650
5	21 57 41.42	1.9429	11 19 0.1	7.697
6	21 59 37.94	1.9411	11 11 16.9	7.743
7	22 1 34.35	1.9392	11 3 30.9	7.789
8	22 3 30.65	1.9374	10 55 42.2	7.835
9	22 5 26.84	1.9357	10 47 50.7	7.880
10	22 7 22.93	1.9339	10 39 56.6	7.924
11	22 9 18.91	1.9322	10 31 59.8	7.968
12	22 11 14.79	1.9305	10 24 0.4	8.012
13	22 13 10.57	1.9288	10 15 58.4	8.054
14	22 15 6.25	1.9272	10 7 53.9	8.096
15	22 17 1.84	1.9257	9 59 46.9	8.138
16	22 18 57.34	1.9242	9 51 37.4	8.179
17	22 20 52.75	1.9227	9 43 25.4	8.221
18	22 22 48.07	1.9212	9 35 10.9	8.262
19	22 24 43.30	1.9198	9 26 54.0	8.301
20	22 26 38.45	1.9184	9 18 34.8	8.339
21	22 28 33.51	1.9171	9 10 13.3	8.377
22	22 30 28.50	1.9158	9 1 49.5	8.416
23	22 32 23.41	1.9146	S. 8 53 23.4	8.454

TUESDAY 22.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
0	22 34 18.24	1.9133	S. 8 44 55.0	8.492
1	22 36 13.00	1.9121	8 36 24.4	8.528
2	22 38 7.69	1.9109	8 27 51.7	8.564
3	22 40 2.31	1.9098	8 19 16.8	8.600
4	22 41 56.87	1.9087	8 10 39.7	8.635
5	22 43 51.36	1.9077	8 2 0.6	8.669
6	22 45 45.79	1.9067	7 53 19.4	8.704
7	22 47 40.17	1.9058	7 44 36.1	8.738
8	22 49 34.49	1.9048	7 35 50.8	8.771
9	22 51 28.75	1.9039	7 27 3.6	8.803
10	22 53 22.96	1.9031	7 18 14.5	8.834
11	22 55 17.13	1.9024	7 9 23.5	8.866
12	22 57 11.25	1.9017	7 0 30.6	8.897
13	22 59 5.33	1.9010	6 51 35.8	8.928
14	23 0 59.37	1.9003	6 42 39.2	8.958
15	23 2 53.37	1.8997	6 33 40.8	8.988
16	23 4 47.34	1.8992	6 24 40.6	9.017
17	23 6 41.28	1.8987	6 15 38.7	9.046
18	23 8 35.18	1.8982	6 6 35.1	9.074
19	23 10 29.06	1.8978	5 57 29.8	9.102
20	23 12 22.92	1.8974	5 48 22.9	9.128
21	23 14 16.75	1.8970	5 39 14.4	9.155
22	23 16 10.56	1.8968	5 30 4.3	9.181
23	23 18 4.36	1.8966	5 20 52.7	9.207
24	23 19 58.15	1.8964	S. 5 11 39.5	9.233

WEDNESDAY 23.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
	h m s	s	° ′ ″	″
0	23 19 58.15	1.8964	S. 5 11 39.5	9.233
1	23 21 51.93	1.8962	5 2 24.8	9.257
2	23 23 45.70	1.8961	4 53 8.7	9.280
3	23 25 39.46	1.8960	4 43 51.2	9.303
4	23 27 33.22	1.8961	4 34 32.3	9.327
5	23 29 26.99	1.8962	4 25 12.0	9.350
6	23 31 20.76	1.8963	4 15 50.3	9.372
7	23 33 14.54	1.8964	4 6 27.3	9.393
8	23 35 8.33	1.8966	3 57 3.1	9.414
9	23 37 2.13	1.8968	3 47 37.6	9.435
10	23 38 55.95	1.8972	3 38 10.9	9.455
11	23 40 49.79	1.8975	3 28 43.0	9.474
12	23 42 43.65	1.8979	3 19 14.0	9.493
13	23 44 37.54	1.8984	3 9 43.9	9.512
14	23 46 31.46	1.8989	3 0 12.6	9.531
15	23 48 25.41	1.8994	2 50 40.2	9.548
16	23 50 19.39	1.8999	2 41 6.8	9.564
17	23 52 13.40	1.9005	2 31 32.5	9.580
18	23 54 7.45	1.9013	2 21 57.2	9.597
19	23 56 1.55	1.9021	2 12 20.9	9.612
20	23 57 55.70	1.9029	2 2 43.8	9.626
21	23 59 49.90	1.9037	1 53 5.8	9.641
22	0 1 44.15	1.9046	1 43 26.9	9.655
23	0 3 38.46	1.9056	S. 1 33 47.2	9.668

THURSDAY 24.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
0	0 5 32.82	1.9066	S. 1 24 6.8	9.680
1	0 7 27.25	1.9077	1 14 25.6	9.692
2	0 9 21.74	1.9088	1 4 43.7	9.704
3	0 11 16.30	1.9099	0 55 1.1	9.715
4	0 13 10.93	1.9112	0 45 17.9	9.725
5	0 15 5.64	1.9125	0 35 34.1	9.736
6	0 17 0.43	1.9138	0 25 49.6	9.746
7	0 18 55.30	1.9152	0 16 4.6	9.754
8	0 20 50.25	1.9166	S. 0 6 19.1	9.762
9	0 22 45.29	1.9181	N. 0 3 26.8	9.769
10	0 24 40.42	1.9196	0 13 13.2	9.777
11	0 26 35.64	1.9212	0 23 0.0	9.784
12	0 28 30.96	1.9228	0 32 47.3	9.791
13	0 30 26.38	1.9245	0 42 34.9	9.795
14	0 32 21.90	1.9262	0 52 22.7	9.799
15	0 34 17.53	1.9281	1 2 10.8	9.804
16	0 36 13.27	1.9299	1 11 59.2	9.808
17	0 38 9.13	1.9319	1 21 47.8	9.811
18	0 40 5.10	1.9338	1 31 36.5	9.813
19	0 42 1.19	1.9358	1 41 25.4	9.815
20	0 43 57.41	1.9379	1 51 14.3	9.816
21	0 45 53.75	1.9401	2 1 3.3	9.817
22	0 47 50.22	1.9422	2 10 52.3	9.817
23	0 49 46.82	1.9445	2 20 41.3	9.817
24	0 51 43.56	1.9468	N. 2 30 30.3	[illegible]

GREENWICH MEAN TIME.

THE MOON'S RIGHT ASCENSION AND DECLINATION.

FRIDAY 25.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
	h m s	s	° ′ ″	″
0	0 51 43.56	1.9468	N. 2 30 30.3	9.816
1	0 53 40.44	1.9492	2 40 19.2	9.813
2	0 55 37.46	1.9516	2 50 7.9	9.811
3	0 57 34.63	1.9541	2 59 56.5	9.808
4	0 59 31.95	1.9566	3 9 44.9	9.804
5	1 1 29.42	1.9591	3 19 33.0	9.799
6	1 3 27.04	1.9617	3 29 20.8	9.794
7	1 5 24.82	1.9644	3 39 8.3	9.788
8	1 7 22.77	1.9672	3 48 55.4	9.782
9	1 9 20.88	1.9699	3 58 42.1	9.775
10	1 11 19.16	1.9727	4 8 28.4	9.767
11	1 13 17.61	1.9756	4 18 14.2	9.759
12	1 15 16.23	1.9785	4 27 59.5	9.750
13	1 17 15.03	1.9816	4 37 44.2	9.740
14	1 19 14.02	1.9847	4 47 28.3	9.730
15	1 21 13.19	1.9878	4 57 11.8	9.719
16	1 23 12.55	1.9909	5 6 54.6	9.707
17	1 25 12.10	1.9941	5 16 36.6	9.693
18	1 27 11.84	1.9973	5 26 17.8	9.680
19	1 29 11.78	2.0007	5 35 58.2	9.666
20	1 31 11.92	2.0041	5 45 37.7	9.652
21	1 33 12.27	2.0075	5 55 16.4	9.636
22	1 35 12.82	2.0109	6 4 54.1	9.619
23	1 37 13.58	2.0145	N. 6 14 30.7	9.602

SATURDAY 26.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
0	1 39 14.56	2.0181	N. 6 24 6.3	9.584
1	1 41 15.74	2.0217	6 33 40.8	9.566
2	1 43 17.16	2.0253	6 43 14.2	9.547
3	1 45 18.79	2.0291	6 52 46.4	9.526
4	1 47 20.65	2.0329	7 2 17.3	9.505
5	1 49 22.74	2.0367	7 11 47.0	9.483
6	1 51 25.05	2.0405	7 21 15.3	9.460
7	1 53 27.60	2.0445	7 30 42.2	9.437
8	1 55 30.39	2.0485	7 40 7.7	9.413
9	1 57 33.42	2.0525	7 49 31.8	9.388
10	1 59 36.69	2.0565	7 58 54.3	9.362
11	2 1 40.20	2.0606	8 8 15.2	9.335
12	2 3 43.96	2.0647	8 17 34.5	9.307
13	2 5 47.97	2.0690	8 26 52.1	9.279
14	2 7 52.24	2.0733	8 36 8.0	9.249
15	2 9 56.77	2.0777	8 45 22.0	9.218
16	2 12 1.56	2.0820	8 54 34.2	9.187
17	2 14 6.61	2.0863	9 3 44.5	9.156
18	2 16 11.92	2.0907	9 12 52.9	9.123
19	2 18 17.50	2.0953	9 21 59.3	9.089
20	2 20 23.36	2.0999	9 31 3.6	9.054
21	2 22 29.49	2.1044	9 40 5.8	9.018
22	2 24 35.80	2.1090	9 49 5.8	8.982
23	2 26 42.57	2.1136	9 58 3.6	8.944
24	2 28 49.53	2.1183	N.10 6 59.1	8.906

SUNDAY 27.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
	h m s	s	° ′ ″	″
0	2 28 49.53	2.1183	N.10 6 59.1	8.906
1	2 30 56.77	2.1231	10 15 52.3	8.867
2	2 33 4.30	2.1279	10 24 43.1	8.826
3	2 35 12.12	2.1327	10 33 31.4	8.784
4	2 37 20.23	2.1376	10 42 17.2	8.742
5	2 39 28.63	2.1424	10 51 0.5	8.699
6	2 41 37.32	2.1473	10 59 41.1	8.654
7	2 43 46.31	2.1523	11 8 19.0	8.609
8	2 45 55.60	2.1573	11 16 54.2	8.563
9	2 48 5.19	2.1623	11 25 26.6	8.516
10	2 50 15.08	2.1674	11 33 56.1	8.467
11	2 52 25.28	2.1725	11 42 22.7	8.417
12	2 54 35.78	2.1776	11 50 46.2	8.367
13	2 56 46.59	2.1827	11 59 6.7	8.316
14	2 58 57.71	2.1879	12 7 24.1	8.264
15	3 1 9.14	2.1932	12 15 38.4	8.211
16	3 3 20.89	2.1984	12 23 49.4	8.156
17	3 5 32.95	2.2037	12 31 57.1	8.100
18	3 7 45.33	2.2090	12 40 1.4	8.043
19	3 9 58.03	2.2143	12 48 2.3	7.986
20	3 12 11.05	2.2196	12 55 59.7	7.927
21	3 14 24.38	2.2249	13 3 53.5	7.867
22	3 16 38.04	2.2303	13 11 43.7	7.806
23	3 18 52.02	2.2357	N.13 19 30.2	7.743

MONDAY 28.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
0	3 21 6.32	2.2411	N.13 27 12.9	7.680
1	3 23 20.95	2.2465	13 34 51.8	7.616
2	3 25 35.90	2.2519	13 42 26.8	7.551
3	3 27 51.18	2.2574	13 49 57.9	7.484
4	3 30 6.79	2.2629	13 57 24.9	7.417
5	3 32 22.73	2.2684	14 4 47.9	7.348
6	3 34 39.00	2.2739	14 12 6.7	7.278
7	3 36 55.60	2.2793	14 19 21.3	7.207
8	3 39 12.52	2.2847	14 26 31.6	7.135
9	3 41 29.77	2.2902	14 33 37.5	7.062
10	3 43 47.35	2.2957	14 40 39.0	6.987
11	3 46 5.26	2.3013	14 47 36.0	6.912
12	3 48 23.51	2.3069	14 54 28.5	6.836
13	3 50 42.09	2.3123	15 1 16.3	6.758
14	3 53 0.99	2.3178	15 7 59.4	6.679
15	3 55 20.22	2.3233	15 14 37.8	6.599
16	3 57 39.79	2.3288	15 21 11.3	6.517
17	3 59 59.68	2.3342	15 27 39.9	6.435
18	4 2 19.90	2.3397	15 34 3.5	6.351
19	4 4 40.45	2.3452	15 40 22.0	6.267
20	4 7 1.33	2.3507	15 46 35.5	6.182
21	4 9 22.53	2.3561	15 52 43.8	6.094
22	4 11 44.06	2.3615	15 58 46.8	6.006
23	4 14 5.91	2.3669	16 4 44.5	5.917
24	4 16 28.09	2.3723	N.16 10 36.9	5.827

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Name and Direction of Object.		Noon.	P. L. of Diff.	IIIh.	P. L. of Diff.	VIh.	P. L. of Diff.	IXh.	P. L. of Diff.
4	Sun	W.	25° 59′ 14″	2592	27° 38′ 20″	2580	29° 17′ 43″	2569	30° 57′ 21″	2560
	Regulus	E.	49 4 39	2212	47 16 30	2209	45 28 16	2206	43 39 58	2204
	Mars	E.	68 5 30	2333	66 20 19	2330	64 35 3	2326	62 49 42	2324
	Jupiter	E.	77 3 12	2220	75 15 15	2217	73 27 13	2214	71 39 6	2211
	Spica	E.	102 40 50	2229	100 53 6	2225	99 5 16	2222	97 17 21	2219
5	Sun	W.	39 18 4	2532	40 58 33	2529	42 39 6	2527	44 19 42	2526
	Saturn	W.	15 49 52	2366	17 34 16	2340	19 19 18	2321	21 4 47	2309
	Regulus	E.	34 37 45	2198	32 49 15	2199	31 0 46	2200	29 12 19	2202
	Mars	E.	54 2 16	2317	52 16 42	2318	50 31 9	2319	48 45 37	2320
	Jupiter	E.	62 37 47	2204	60 49 26	2205	59 1 6	2206	57 12 47	2207
	Spica	E.	88 16 59	2212	86 28 50	2212	84 40 41	2212	82 52 32	2213
6	Sun	W.	52 42 51	2527	54 23 26	2530	56 3 58	2533	57 44 26	2535
	Saturn	W.	29 55 27	2281	31 41 54	2281	33 28 22	2281	35 14 50	2281
	Mars	E.	39 58 25	2330	38 13 9	2333	36 27 58	2336	34 42 51	2339
	Jupiter	E.	48 11 38	2216	46 23 34	2219	44 35 34	2222	42 47 39	2226
	Spica	E.	73 52 19	2224	72 4 27	2227	70 16 40	2231	68 28 58	2236
7	Sun	W.	66 5 39	2555	67 45 36	2559	69 25 27	2564	71 5 11	2570
	Saturn	W.	44 6 38	2294	45 52 47	2297	47 38 51	2301	49 24 49	2306
	Pollux	W.	32 4 32	2493	33 45 55	2474	35 27 44	2460	37 9 53	2448
	Jupiter	E.	33 49 34	2247	32 2 17	2253	30 15 8	2258	28 28 7	2264
	Spica	E.	59 32 9	2260	57 45 11	2266	55 58 22	2272	54 11 42	2279
	Antares	E.	105 18 7	2299	103 32 6	2304	101 46 12	2308	100 0 24	2313
8	Sun	W.	79 21 49	2601	81 0 43	2608	82 39 27	2615	84 18 2	2621
	Saturn	W.	58 12 50	2333	59 58 2	2339	61 43 5	2345	63 27 59	2351
	Pollux	W.	45 43 43	2421	47 26 48	2419	49 9 55	2419	50 53 2	2420
	Spica	E.	45 21 3	2319	43 35 31	2328	41 50 12	2337	40 5 7	2348
	Antares	E.	91 13 17	2341	89 28 17	2348	87 43 27	2354	85 58 46	2362
9	Sun	W.	92 28 31	2659	94 6 6	2667	95 43 30	2675	97 20 43	2683
	Saturn	W.	72 10 7	2385	73 54 3	2392	75 37 49	2400	77 21 24	2407
	Pollux	W.	59 28 7	2432	61 10 56	2436	62 53 39	2441	64 36 15	2446
	Regulus	W.	22 44 57	2345	24 29 51	2351	26 14 36	2357	27 59 12	2364
	Antares	E.	77 18 1	2400	75 34 26	2408	73 51 2	2417	72 7 51	2425
10	Sun	W.	105 24 6	2725	107 0 13	2733	108 36 9	2742	110 11 53	2750
	Saturn	W.	85 56 40	2445	87 39 10	2453	89 21 30	2460	91 3 39	2468
	Pollux	W.	73 7 26	2474	74 49 16	2480	76 30 57	2487	78 12 28	2494
	Regulus	W.	36 39 46	2399	38 23 22	2406	40 6 48	2414	41 50 3	2422
	Mars	W.	15 5 14	2533	16 45 41	2541	18 25 57	2549	20 6 2	2558
	Antares	E.	63 35 6	2472	61 53 14	2482	60 11 36	2493	58 30 13	2504
11	Sun	W.	118 7 41	2795	119 42 15	2805	121 16 37	2814	122 50 47	2823
	Saturn	W.	99 31 36	2509	101 12 37	2517	102 53 27	2525	104 34 6	2533
	Pollux	W.	86 37 36	2531	88 18 6	2538	89 58 26	2546	91 38 35	2554
	Regulus	W.	50 23 34	2460	52 5 44	2467	53 47 43	2476	55 29 30	2484
	Mars	W.	28 23 35	2599	30 2 31	2607	31 41 16	2616	33 19 49	2624
	Jupiter	W.	23 3 32	2475	23 45 20	2483	25 26 57	2492	27 8 22	2499
	Antares	E.	50 7 19	2565	48 27 36	2579	46 48 12	2593	45 9 7	2606

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Name and Direction of Object.		Noon.	P. L. of Diff.	IIIh.	P. L. of Diff.	VIh.	P. L. of Diff.	IXh.	P. L. of Diff.
12	Sun	W.	130° 38′ 32″	2872	132° 11′ 27″	2882	133° 44′ 9″	2893	135° 16′ 37″	2903
	Regulus	W.	63 55 39	2524	65 36 19	2532	67 16 48	2540	68 57 5	2548
	Mars	W.	41 29 43	2667	43 7 7	2676	44 44 19	2684	46 21 20	2693
	Jupiter	W.	35 32 37	2540	37 12 54	2549	38 52 59	2558	40 32 52	2566
	Antares	E.	36 59 23	2701	35 22 45	2725	33 46 39	2751	32 11 7	2781
	α Aquilæ	E.	86 22 4	2986	84 51 34	2997	83 21 18	3009	81 51 16	3021
13	Regulus	W.	77 15 41	2590	78 54 50	2599	80 33 47	2607	82 12 32	2615
	Mars	W.	54 23 27	2738	55 59 17	2747	57 34 55	2756	59 10 21	2764
	Jupiter	W.	48 49 24	2609	50 28 7	2618	52 6 38	2626	53 44 58	2635
	Spica	W.	24 8 43	2698	25 45 25	2694	27 22 13	2692	28 59 3	2692
	α Aquilæ	E.	74 25 14	3095	72 56 58	3113	71 29 4	3132	70 1 33	3152
	Fomalhaut	E.	107 15 25	2941	105 43 58	2943	104 12 34	2947	102 41 15	2951
14	Regulus	W.	90 23 22	2660	92 0 56	2668	93 38 19	2677	95 15 30	2686
	Mars	W.	67 4 32	2811	68 38 45	2820	70 12 47	2829	71 46 37	2839
	Jupiter	W.	61 53 38	2679	63 30 46	2688	65 7 42	2697	66 44 26	2707
	Spica	W.	37 2 40	2709	38 39 8	2714	40 15 29	2720	41 51 42	2726
	α Aquilæ	E.	62 50 22	3270	61 25 35	3298	60 1 21	3328	58 37 42	3359
	Fomalhaut	E.	95 6 13	2981	93 35 37	2989	92 5 10	2997	90 34 54	3005
15	Mars	W.	79 32 41	2887	81 5 16	2897	82 37 39	2906	84 9 50	2916
	Jupiter	W.	74 45 1	2753	76 20 31	2762	77 55 49	2771	79 30 55	2780
	Spica	W.	49 50 36	2762	51 25 54	2770	53 1 1	2778	54 35 58	2785
	α Aquilæ	E.	51 49 24	3556	50 30 2	3605	49 11 33	3657	47 54 0	3713
	Fomalhaut	E.	83 6 25	3057	81 37 23	3069	80 8 35	3081	78 40 2	3093
16	Jupiter	W.	87 23 22	2827	88 57 15	2837	90 30 55	2846	92 4 23	2855
	Spica	W.	62 28 4	2828	64 1 56	2836	65 35 37	2844	67 9 8	2852
	Fomalhaut	E.	71 21 23	3167	69 54 34	3183	68 28 4	3200	67 1 55	3218
	α Pegasi	E.	86 1 58	3085	84 33 30	3096	83 5 15	3107	81 37 14	3118
17	Jupiter	W.	99 48 48	2901	101 21 6	2909	102 53 13	2919	104 25 8	2927
	Spica	W.	74 53 53	2897	76 26 16	2905	77 58 29	2913	79 30 31	2922
	Antares	W.	30 6 41	3118	31 34 29	3106	33 2 31	3097	34 30 44	3091
	Fomalhaut	E.	59 56 47	3320	58 32 59	3345	57 9 39	3370	55 46 48	3396
	α Pegasi	E.	74 20 44	3182	72 54 13	3196	71 27 59	3210	70 2 2	3225
18	Spica	W.	87 8 3	2963	88 39 2	2970	90 9 52	2978	91 40 32	2986
	Antares	W.	41 53 13	3078	43 21 49	3079	44 50 24	3081	46 18 57	3082
	Fomalhaut	E.	49 0 35	3554	47 41 10	3591	46 22 26	3633	45 4 27	3677
	α Pegasi	E.	62 56 55	3309	61 32 54	3327	60 9 14	3346	58 45 56	3366
19	Antares	W.	53 41 7	3095	55 9 23	3098	56 37 35	3101	58 5 44	3104
	Fomalhaut	E.	38 47 32	3962	37 35 15	4036	36 24 11	4119	35 14 28	4211
	α Pegasi	E.	51 55 38	3485	50 34 57	3513	49 14 47	3542	47 55 9	3574
	α Arietis	E.	94 5 25	3135	92 37 58	3142	91 10 39	3148	89 43 27	3153
	Venus	E.	106 27 57	3437	105 6 22	3444	103 44 55	3451	102 23 36	3458
20	Antares	W.	65 25 33	3119	66 53 20	3120	68 21 5	3123	69 48 47	3125
	α Arietis	E.	82 29 11	3182	81 2 40	3187	79 36 15	3192	78 9 56	3198
	Venus	E.	95 38 47	3486	94 18 7	3490	92 57 32	3495	91 37 2	3499

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Name and Direction of Object.		Midnight.	P. L. of Diff.	XVh.	P. L. of Diff.	XVIIIh.	P. L. of Diff.	XXIh.	P. L. of Diff.
20	Sun	E.	130° 14′ 16″	3450	128° 52′ 56″	3452	127° 31′ 38″	3454	126° 10′ 22″	3455
21	Antares	W.	82 56 41	3133	84 24 11	3133	85 51 41	3131	87 19 13	3130
	α Aquilæ	W.	40 58 44	4390	42 5 18	4249	43 12 58	4184	44 21 39	4195
	α Arietis	E.	65 17 16	3936	63 51 50	3941	62 26 29	3944	61 1 12	3948
	Venus	E.	79 34 58	3516	78 14 52	3515	76 54 45	3515	75 34 38	3515
	Aldebaran	E.	97 11 36	3070	95 42 50	3070	94 14 4	3069	92 45 17	3069
	Sun	E.	119 24 18	3456	118 3 5	3455	116 41 51	3454	115 20 35	3453
22	Antares	W.	94 37 24	3118	96 5 12	3114	97 33 4	3110	99 1 1	3106
	α Aquilæ	W.	50 18 2	3890	51 31 32	3853	52 45 40	3817	54 0 25	3784
	α Arietis	E.	53 55 59	3969	52 31 11	3974	51 6 29	3979	49 41 53	3985
	Venus	E.	68 53 34	3502	67 33 12	3497	66 12 45	3493	64 52 13	3488
	Aldebaran	E.	85 20 50	3056	83 51 46	3052	82 22 37	3047	80 53 23	3043
	Sun	E.	108 33 39	3437	107 12 4	3432	105 50 24	3428	104 28 39	3422
23	α Aquilæ	W.	60 22 18	3639	61 40 10	3615	62 58 28	3591	64 17 12	3567
	α Arietis	E.	42 40 50	3325	41 17 8	3337	39 53 39	3351	38 30 26	3366
	Venus	E.	58 7 58	3455	56 46 44	3447	55 25 21	3439	54 3 49	3431
	Aldebaran	E.	73 25 34	3012	71 55 36	3005	70 25 29	2997	68 55 12	2989
	Sun	E.	97 38 8	3387	96 15 37	3379	94 52 57	3371	93 30 7	3361
24	α Aquilæ	W.	70 57 4	3461	72 18 12	3440	73 39 43	3421	75 1 36	3402
	Fomalhaut	W.	38 29 0	3853	39 43 8	3785	40 58 26	3722	42 14 50	3663
	Venus	E.	47 13 26	3379	45 50 46	3367	44 27 52	3356	43 4 44	3343
	Aldebaran	E.	61 20 57	2939	59 49 27	2928	58 17 44	2917	56 45 47	2905
	Sun	E.	86 33 6	3306	85 9 4	3296	83 44 48	3284	82 20 18	3270
25	α Aquilæ	W.	81 56 17	3312	83 20 15	3294	84 44 33	3278	86 9 10	3261
	Fomalhaut	W.	48 51 16	3423	50 13 6	3384	51 35 41	3345	52 59 0	3306
	α Pegasi	W.	35 0 18	3804	36 15 16	3720	37 31 42	3644	38 49 29	3574
	Venus	E.	36 5 22	3276	34 40 42	3261	33 15 45	3247	31 50 31	3233
	Aldebaran	E.	49 2 2	2839	47 28 25	2825	45 54 30	2811	44 20 17	2797
	Sun	E.	75 13 48	3201	73 47 40	3185	72 21 13	3170	70 54 28	3154
26	Fomalhaut	W.	60 5 44	3146	61 32 58	3117	63 0 47	3088	64 29 11	3060
	α Pegasi	W.	45 35 52	3294	47 0 11	3247	48 25 24	3204	49 51 28	3163
	Venus	E.	24 40 4	3160	23 13 7	3146	21 45 53	3133	20 18 24	3122
	Aldebaran	E.	36 24 12	2718	34 47 56	2701	33 11 18	2685	31 34 18	2669
	Sun	E.	63 35 49	3071	62 7 4	3053	60 37 57	3036	59 8 29	3018
27	Fomalhaut	W.	71 59 24	2934	•73 31 0	2910	75 3 6	2887	76 35 42	2864
	α Pegasi	W.	57 13 26	2965	58 43 58	2933	60 15 10	2904	61 46 59	2874
	Sun	E.	51 35 36	2929	50 3 54	2911	48 31 49	2893	46 59 21	2876
28	Fomalhaut	W.	84 25 38	2768	86 0 56	2744	87 36 38	2726	89 12 44	2706
	α Pegasi	W.	69 35 2	2763	71 10 19	2739	72 46 7	2716	74 22 25	2694
	Sun	E.	39 11 23	2790	37 36 42	2774	36 1 40	2758	34 26 17	2743
29	Fomalhaut	W.	97 18 37	2636	98 56 45	2622	100 35 10	2611	102 13 50	2601
	α Pegasi	W.	82 30 58	2606	84 9 58	2580	85 49 21	2564	87 29 6	2548
	Sun	E.	26 24 49	2683	24 47 46	2676	23 10 33	2671	21 33 14	2670

AT GREENWICH MEAN NOON.

Day of the Week.	Day of the Month.	THE SUN'S Apparent Right Ascension.	THE SUN'S Diff. for 1 Hour.	THE SUN'S Apparent Declination.	THE SUN'S Diff. for 1 Hour.	Equation of Time, to be Subtracted from Mean Time.	Diff. for 1 Hour.	Sidereal Time, or Right Ascension of Mean Sun.
		h m s	s	° ′ ″	″	m s	s	h m s
Thur.	1	6 41 23.54	10.343	N. 23 6 36.6	−10.22	3 32.55	0.487	6 37 50.99
Frid.	2	6 45 31.64	10.331	23 2 19.1	11.23	3 44.09	0.475	6 41 47.55
Sat.	3	6 49 39.45	10.319	22 57 37.5	12.23	3 55.35	0.463	6 45 44.10
SUN.	4	6 53 46.95	10.306	22 52 31.9	−13.23	4 6.29	0.450	6 49 40.66
Mon.	5	6 57 54.14	10.292	22 47 2.4	14.22	4 16.92	0.436	6 53 37.22
Tues.	6	7 2 0.97	10.277	22 41 9.2	15.21	4 27.19	0.421	6 57 33.78
Wed.	7	7 6 7.43	10.261	22 34 52.4	−16.19	4 37.10	0.405	7 1 30.33
Thur.	8	7 10 13.49	10.244	22 28 12.1	17.16	4 46.60	0.388	7 5 26.89
Frid.	9	7 14 19.12	10.226	22 21 8.5	18.13	4 55.67	0.370	7 9 23.45
Sat.	10	7 18 24.33	10.208	22 13 41.9	−19.09	5 4.32	0.352	7 13 20.01
SUN.	11	7 22 29.10	10.189	22 5 52.3	20.04	5 12.54	0.333	7 17 16.56
Mon.	12	7 26 33:41	10.169	21 57 39.9	20.98	5 20.29	0.313	7 21 13.12
Tues.	13	7 30 37.24	10.149	21 49 4.9	−21.92	5 27.56	0.293	7 25 9.68
Wed.	14	7 34 40.59	10.129	21 40 7.5	22.85	5 34.35	0.273	7 29 6.24
Thur.	15	7 38 43.44	10.108	21 30 47.9	23.77	5 40.65	0.252	7 33 2.79
Frid.	16	7 42 45.79	10.087	21 21 6.4	−24.68	5 46.44	0.231	7 36 59.35
Sat.	17	7 46 47.62	10.065	21 11 3.1	25.58	5 51.72	0.209	7 40 55.90
SUN.	18	7 50 48.93	10.043	21 0 38.2	26.47	5 56.48	0.187	7 44 52.46
Mon.	19	7 54 49.72	10.021	20 49 51.9	−27.36	6 0.71	0.165	7 48 49.01
Tues.	20	7 58 49.97	9.999	20 38 44.6	28.23	6 4.40	0.143	7 52 45.57
Wed.	21	8 2 49.68	9.976	20 27 16.5	29.10	6 7.56	0.120	7 56 42.12
Thur.	22	8 6 48.85	9.953	20 15 27.7	−29.95	6 10.17	0.097	8 0 38.68
Frid.	23	8 10 47.46	9.930	20 3 18.5	30.80	6 12.23	0.074	8 4 35.23
Sat.	24	8 14 45.50	9.907	19 50 49.1	31.64	6 13.71	0.051	8 8 31.79
SUN.	25	8 18 42.99	9.884	19 37 59.8	−32.46	6 14.65	0.028	8 12 28.34
Mon.	26	8 22 39.91	9.860	19 24 50.9	33.27	6 15.01	0.004	8 16 24.90
Tues.	27	8 26 36.25	9.836	19 11 22.7	34.07	6 14.80	0.020	8 20 21.45
Wed.	28	8 30 32.01	9.811	18 57 35.5	−34.86	6 14.00	0.045	8 24 18.01
Thur.	29	8 34 27.18	9.786	18 43 29.4	35.64	6 12.61	0.070	8 28 14.56
Frid.	30	8 38 21.74	9.761	18 29 4.8	36.41	6 10.62	0.095	8 32 11.12
Sat.	31	8 42 15.71	9.736	18 14 22.1	37.16	6 8.03	0.120	8 36 7.68
SUN.	32	8 46 9.07	9.711	N. 17 59 21.4	−37.90	6 4.84	0.145	8 40 4.23

NOTE.—The semidiameter for mean noon may be assumed the same as that for apparent noon.
The sign − prefixed to the hourly change of declination indicates that north declinations are decreasing.

Diff. for 1 Hour.
+ 9s.8565.
(Table III.)

GREENWICH MEAN TIME.

THE MOON'S

Day of the Month.	SEMIDIAMETER. Noon.	SEMIDIAMETER. Midnight.	HORIZONTAL PARALLAX. Noon.	Diff. for 1 Hour.	Midnight.	Diff. for 1 Hour.	UPPER TRANSIT. Meridian of Greenwich.	Diff. for 1 Hour.	AGE. Noon.
	′ ″	′ ″	′ ″	″	′ ″	″	h m	m	d
1	16 22.5	16 26.7	59 59.3	+1.39	60 14.4	+1.11	ó		28.9
2	16 29.8	16 31.9	60 25.9	0.80	60 33.6	+0.47	0 37.5	2.53	0.6
3	16 32.9	16 32.8	60 37.2	+0.14	60 36.9	−0.18	1 37.8	2.49	1.6
4	16 31.7	16 29.6	60 32.8	−0.49	60 25.2	−0.77	2 36.6	2.40	2.6
5	16 26.7	16 23.0	60 14.5	1.01	60 1.0	1.22	2 32.8	2.29	3.6
6	16 18.7	16 13.9	59 45.2	1.39	59 27.7	1.51	4 26.6	2.19	4.6
7	16 8.8	16 3.5	59 8.9	−1.61	58 49.2	−1.66	5 18.4	2.12	5.6
8	15 58.0	15 52.5	58 29.0	1.68	58 8.8	1.68	6 8.8	2.08	6.6
9	15 47.0	15 41.6	57 48.7	1.66	57 28.9	1.62	6 58.4	2.06	7.6
10	15 36.4	15 31.4	57 9.7	−1.57	56 51.3	−1.51	7 48.0	2.07	8.6
11	15 26.6	15 22.0	56 33.7	1.44	56 16.9	1.37	8 37.9	2.08	9.6
12	15 17.6	15 13.5	56 0.9	1.29	55 45.8	1.22	9 28.0	2.09	10.6
13	15 9.7	15 6.0	55 31.6	−1.15	55 18.3	−1.07	10 18.2	2.09	11.6
14	15 2.7	14 59.5	55 5.9	1.00	54 54.4	0.92	11 8.0	2.06	12.6
15	14 56.7	14 54.1	54 43.9	0.83	54 34.4	0.75	11 56.9	2.01	13.6
16	14 51.8	14 49.8	54 25.9	−0.66	54 18.6	−0.56	12 44.6	1.95	14.6
17	14 48.1	14 46.8	54 12.5	0.45	54 7.7	0.34	13 30.7	1.89	15.6
18	14 45.9	14 45.4	54 4.3	−0.22	54 2.5	−0.06	14 15.3	1.83	16.6
19	14 45.4	14 45.8	54 2.4	+0.06	54 4.0	+0.22	14 58.7	1.79	17.6
20	14 46.8	14 48.3	54 7.6	0.38	54 13.2	0.55	15 41.3	1.77	18.6
21	14 50.4	14 53.1	54 20.9	0.73	54 30.8	0.93	16 23.9	1.78	19.6
22	14 56.5	15 0.4	54 43.1	+1.12	54 57.7	+1.31	17 7.2	1.83	20.6
23	15 5.0	15 10.2	55 14.5	1.50	55 33.6	1.68	17 51.8	1.90	21.6
24	15 16.0	15 22.3	55 54.9	1.85	56 18.2	2.02	18 38.8	2.02	22.6
25	15 29.2	15 36.4	56 43.3	+2.16	57 9.9	+2.26	19 28.7	2.15	23.6
26	15 44.0	15 51.7	57 37.6	2.33	58 5.9	2.37	20 22.1	2.30	24.6
27	15 59.4	16 7.1	58 34.4	2.36	59 2.4	2.29	21 18.9	2.43	25.6
28	16 14.4	16 21.2	59 29.3	+2.17	59 54.4	+1.99	22 18.5	2.52	26.6
29	16 27.4	16 32.6	60 17.0	1.75	60 36.4	1.46	23 19.4	2.54	27.6
30	16 36.9	16 40.0	60 52.1	1.13	61 3.5	+0.76	ó		28.6
31	16 41.9	16 42.4	61 10.4	+0.37	61 12.4	−0.03	0 20.0	2.50	0.3
32	16 41.7	16 39.7	61 9.6	−0.43	61 2.2	−0.80	1 19.1	2.42	1.3

GREENWICH MEAN TIME.

THE MOON'S RIGHT ASCENSION AND DECLINATION.

THURSDAY 1.

Hour.	Right Ascension. h m s	Diff. for 1 Minute. s	Declination. ° ′ ″	Diff. for 1 Minute. ″
0	6 15 41.36	2.5697	N.18 46 58.6	0.358
1	6 18 15.61	2.5719	18 47 16.2	0.227
2	6 20 49.99	2.5740	18 47 25.9	+ 0.095
3	6 23 24.49	2.5759	18 47 27.6	− 0.037
4	6 25 59.10	2.5778	18 47 21.4	0.169
5	6 28 33.83	2.5797	18 47 7.3	0.302
6	6 31 8.66	2.5813	18 46 45.2	0.435
7	6 33 43.58	2.5828	18 46 15.1	0.567
8	6 36 18.59	2.5843	18 45 37.1	0.700
9	6 38 53.69	2.5857	18 44 51.1	0.834
10	6 41 28.87	2.5869	18 43 57.1	0.968
11	6 44 4.12	2.5879	18 42 55.0	1.101
12	6 46 39.42	2.5889	18 41 45.0	1.233
13	6 49 14.78	2.5898	18 40 27.0	1.367
14	6 51 50.20	2.5906	18 39 0.9	1.501
15	6 54 25.66	2.5913	18 37 26.8	1.635
16	6 57 1.16	2.5919	18 35 44.7	1.768
17	6 59 36.69	2.5924	18 33 54.6	1.902
18	7 2 12.25	2.5927	18 31 56.5	2.035
19	7 4 47.82	2.5930	18 29 50.4	2.168
20	7 7 23.41	2.5932	18 27 36.3	2.302
21	7 9 59.00	2.5932	18 25 14.2	2.434
22	7 12 34.59	2.5932	18 22 44.2	2.567
23	7 15 10.18	2.5931	N.18 20 6.2	2.699

FRIDAY 2.

Hour.	Right Ascension. h m s	Diff. for 1 Minute. s	Declination. ° ′ ″	Diff. for 1 Minute. ″
0	7 17 45.76	2.5928	N.18 17 20.3	2.832
1	7 20 21.32	2.5924	18 14 26.4	2.963
2	7 22 56.85	2.5919	18 11 24.7	3.094
3	7 25 32.35	2.5913	18 8 15.1	3.225
4	7 28 7.81	2.5907	18 4 57.7	3.356
5	7 30 43.22	2.5899	18 1 32.4	3.487
6	7 33 18.60	2.5891	17 57 59.3	3.617
7	7 35 53.92	2.5882	17 54 18.4	3.746
8	7 38 29.18	2.5871	17 50 29.8	3.874
9	7 41 4.37	2.5858	17 46 33.5	4.002
10	7 43 39.48	2.5845	17 42 29.5	4.130
11	7 46 14.51	2.5832	17 38 17.9	4.257
12	7 48 49.46	2.5818	17 33 58.6	4.384
13	7 51 24.32	2.5803	17 29 31.8	4.509
14	7 53 59.09	2.5787	17 24 57.5	4.634
15	7 56 33.76	2.5769	17 20 15.7	4.759
16	7 59 8.32	2.5751	17 15 26.4	4.883
17	8 1 42.77	2.5732	17 10 29.7	5.006
18	8 4 17.10	2.5712	17 5 25.7	5.128
19	8 6 51.31	2.5692	17 0 14.3	5.250
20	8 9 25.39	2.5670	16 54 55.7	5.370
21	8 11 59.35	2.5648	16 49 29.9	5.490
22	8 14 33.17	2.5624	16 43 56.9	5.609
23	8 17 6.84	2.5600	16 38 16.8	5.727
24	8 19 40.37	2.5576	N.16 32 29.7	5.843

SATURDAY 3.

Hour.	Right Ascension. h m s	Diff. for 1 Minute. s	Declination. ° ′ ″
0	8 19 40.37	2.5576	N.16 32 29.7
1	8 22 13.75	2.5550	16 26 35.6
2	8 24 46.97	2.5524	16 20 34.5
3	8 27 20.04	2.5498	16 14 26.5
4	8 29 52.95	2.5471	16 8 11.7
5	8 32 25.69	2.5442	16 1 50.1
6	8 34 58.25	2.5413	15 55 21.8
7	8 37 30.64	2.5383	15 48 46.8
8	8 40 2.85	2.5353	15 42 5.3
9	8 42 34.88	2.5322	15 35 17.3
10	8 45 6.72	2.5291	15 28 22.9
11	8 47 38.37	2.5260	15 21 22.0
12	8 50 9.84	2.5228	15 14 14.8
13	8 52 41.11	2.5195	15 7 1.3
14	8 55 12.18	2.5161	14 59 41.7
15	8 57 43.04	2.5127	14 52 16.0
16	9 0 13.70	2.5092	14 44 44.2
17	9 2 44.15	2.5058	14 37 6.5
18	9 5 14.40	2.5023	14 29 22.9
19	9 7 44.43	2.4988	14 21 33.5
20	9 10 14.25	2.4952	14 13 38.3
21	9 12 43.85	2.4915	14 5 37.4
22	9 15 13.23	2.4878	13 57 30.9
23	9 17 42.39	2.4841	N.13 49 18.9

SUNDAY 4.

Hour.	Right Ascension. h m s	Diff. for 1 Minute. s	Declination. ° ′ ″
0	9 20 11.32	2.4803	N.13 41 1.5
1	9 22 40.03	2.4766	13 32 38.8
2	9 25 8.51	2.4728	13 24 10.7
3	9 27 36.77	2.4690	13 15 37.4
4	9 30 4.79	2.4651	13 6 59.0
5	9 32 32.58	2.4612	12 56 15.5
6	9 35 0.14	2.4574	12 49 27.0
7	9 37 27.47	2.4535	12 40 33.7
8	9 39 54.56	2.4495	12 31 35.5
9	9 42 21.41	2.4455	12 22 32.5
10	9 44 48.02	2.4416	12 13 24.9
11	9 47 14.40	2.4377	12 4 12.8
12	9 49 40.54	2.4337	11 54 56.2
13	9 52 6.44	2.4297	11 45 35.2
14	9 54 32.10	2.4257	11 36 9.8
15	9 56 57.52	2.4217	11 26 40.2
16	9 59 22.70	2.4177	11 17 6.4
17	10 1 47.65	2.4138	11 7 28.6
18	10 4 12.36	2.4098	10 57 46.8
19	10 6 36.83	2.4058	10 48 1.0
20	10 9 1.06	2.4017	10 38 11.4
21	10 11 25.04	2.3977	10 28 18.1
22	10 13 48.78	2.3937	10 18 21.1
23	10 16 12.29	2.3898	10 8 20.5
24	10 18 35.56	2.3858	N. 9 58 16.5

GREENWICH MEAN TIME.

THE MOON'S RIGHT ASCENSION AND DECLINATION.

MONDAY 5.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
	h m s	s	° ′ ″	″
0	10 18 35.56	2.3858	N. 9 58 16.5	10.096
1	10 20 58.59	2.3818	9 48 9.1	10.152
2	10 23 21.38	2.3779	9 37 58.3	10.208
3	10 25 43.94	2.3740	9 27 44.1	10.262
4	10 28 6.26	2.3701	9 17 26.8	10.313
5	10 30 28.35	2.3662	9 7 6.5	10.363
6	10 32 50.20	2.3623	8 56 43.2	10.413
7	10 35 11.82	2.3584	8 46 16.9	10.462
8	10 37 33.21	2.3545	8 35 47.8	10.508
9	10 39 54.36	2.3507	8 25 16.0	10.553
10	10 42 15.29	2.3469	8 14 41.5	10.597
11	10 44 35.99	2.3431	8 4 4.4	10.639
12	10 46 56.46	2.3393	7 53 24.8	10.681
13	10 49 16.71	2.3356	7 42 42.7	10.721
14	10 51 36.73	2.3319	7 31 58.3	10.759
15	10 53 56.53	2.3282	7 21 11.6	10.797
16	10 56 16.11	2.3246	7 10 22.7	10.833
17	10 58 35.48	2.3210	6 59 31.7	10.867
18	11 0 54.63	2.3173	6 48 38.7	10.900
19	11 3 13.56	2.3137	6 37 43.7	10.932
20	11 5 32.28	2.3102	6 26 46.8	10.962
21	11 7 50.79	2.3067	6 15 48.2	10.992
22	11 10 9.09	2.3032	6 4 47.8	11.020
23	11 12 27.18	2.2997	N. 5 53 45.8	11.046

TUESDAY 6.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
0	11 14 45.06	2.2963	N. 5 42 42.3	11.071
1	11 17 2.74	2.2930	5 31 37.3	11.096
2	11 19 20.22	2.2897	5 20 30.8	11.119
3	11 21 37.50	2.2864	5 9 23.0	11.140
4	11 23 54.58	2.2831	4 58 14.0	11.161
5	11 26 11.47	2.2798	4 47 3.7	11.181
6	11 28 28.16	2.2766	4 35 52.3	11.198
7	11 30 44.66	2.2735	4 24 39.9	11.215
8	11 33 0.98	2.2704	4 13 26.5	11.230
9	11 35 17.11	2.2673	4 2 12.3	11.244
10	11 37 33.06	2.2643	3 50 57.2	11.257
11	11 39 48.83	2.2613	3 39 41.4	11.269
12	11 42 4.42	2.2584	3 28 24.9	11.280
13	11 44 19.84	2.2555	3 17 7.8	11.289
14	11 46 35.08	2.2526	3 5 50.2	11.297
15	11 48 50.15	2.2497	2 54 32.2	11.304
16	11 51 5.05	2.2470	2 43 13.8	11.310
17	11 53 19.79	2.2443	2 31 55.0	11.315
18	11 55 34.37	2.2417	2 20 36.0	11.318
19	11 57 48.79	2.2390	2 9 16.9	11.320
20	12 0 3.05	2.2363	1 57 57.6	11.322
21	12 2 17.15	2.2337	1 46 38.3	11.322
22	12 4 31.10	2.2312	1 35 19.0	11.321
23	12 6 44.90	2.2288	1 23 59.8	11.318
24	12 8 58.56	2.2265	N. 1 12 40.8	11.315

WEDNESDAY 7.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
	h m s	s	° ′ ″	″
0	12 8 58.56	2.2265	N. 1 12 40.8	11.315
1	12 11 12.08	2.2241	1 1 22.0	11.311
2	12 13 25.45	2.2217	0 50 3.5	11.306
3	12 15 38.68	2.2194	0 38 45.4	11.298
4	12 17 51.78	2.2172	0 27 27.7	11.291
5	12 20 4.74	2.2149	0 16 10.5	11.282
6	12 22 17.57	2.2127	N. 0 4 53.9	11.272
7	12 24 30.27	2.2107	S. 0 6 22.1	11.261
8	12 26 42.85	2.2087	0 17 37.4	11.249
9	12 28 55.31	2.2067	0 28 52.0	11.237
10	12 31 7.65	2.2047	0 40 5.8	11.223
11	12 33 19.87	2.2027	0 51 18.7	11.208
12	12 35 31.98	2.2009	1 2 30.7	11.192
13	12 37 43.98	2.1991	1 13 41.7	11.174
14	12 39 55.87	2.1973	1 24 51.6	11.156
15	12 42 7.65	2.1955	1 36 0.4	11.137
16	12 44 19.33	2.1938	1 47 8.1	11.117
17	12 46 30.91	2.1922	1 58 14.5	11.096
18	12 48 42.39	2.1906	2 9 19.6	11.074
19	12 50 53.78	2.1891	2 20 23.3	11.051
20	12 53 5.08	2.1876	2 31 25.7	11.027
21	12 55 16.29	2.1861	2 42 26.6	11.002
22	12 57 27.41	2.1846	2 53 25.9	10.976
23	12 59 38.44	2.1832	S. 3 4 23.7	10.950

THURSDAY 8.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
0	13 1 49.39	2.1819	S. 3 15 19.9	10.922
1	13 4 0.27	2.1807	3 26 14.4	10.893
2	13 6 11.07	2.1794	3 37 7.1	10.863
3	13 8 21.79	2.1781	3 47 58.0	10.833
4	13 10 32.44	2.1769	3 58 47.1	10.802
5	13 12 43.02	2.1758	4 9 34.3	10.769
6	13 14 53.54	2.1747	4 20 19.4	10.735
7	13 17 3.99	2.1737	4 31 2.5	10.702
8	13 19 14.38	2.1727	4 41 43.6	10.668
9	13 21 24.72	2.1718	4 52 22.6	10.632
10	13 23 35.00	2.1709	5 2 59.4	10.595
11	13 25 45.23	2.1701	5 13 34.0	10.557
12	13 27 55.41	2.1692	5 24 6.3	10.519
13	13 30 5.54	2.1684	5 34 36.3	10.480
14	13 32 15.62	2.1677	5 45 3.9	10.439
15	13 34 25.66	2.1669	5 55 29.0	10.398
16	13 36 35.65	2.1662	6 5 51.7	10.356
17	13 38 45.61	2.1656	6 16 11.8	10.313
18	13 40 55.53	2.1651	6 26 29.3	10.270
19	13 43 5.42	2.1645	6 36 44.2	10.227
20	13 45 15.27	2.1639	6 46 56.5	10.182
21	13 47 25.09	2.1635	6 57 6.0	10.136
22	13 49 34.89	2.1631	7 7 12.7	10.089
23	13 51 44.66	2.1626	7 17 16.6	10.042
24	13 53 54.40	2.1622	S. 7 27 17.7	9.994

GREENWICH MEAN TIME.

THE MOON'S RIGHT ASCENSION AND DECLINATION.

FRIDAY 9.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
	h m s	s	° ′ ″	″
0	13 53 54.40	2.1622	S. 7 27 17.7	9.994
1	13 56 4.12	2.1618	7 37 15.9	9.945
2	13 58 13.82	2.1616	7 47 11.1	9.895
3	14 0 23.51	2.1613	7 57 3.3	9.844
4	14 2 33.18	2.1611	8 6 52.4	9.793
5	14 4 42.84	2.1608	8 16 38.4	9.741
6	14 6 52.48	2.1606	8 26 21.3	9.688
7	14 9 2.11	2.1605	8 36 1.0	9.635
8	14 11 11.74	2.1604	8 45 37.5	9.581
9	14 13 21.36	2.1603	8 55 10.7	9.526
10	14 15 30.98	2.1602	9 4 40.6	9.470
11	14 17 40.59	2.1602	9 14 7.1	9.413
12	14 19 50.20	2.1602	9 23 30.2	9.356
13	14 21 59.81	2.1602	9 32 49.8	9.298
14	14 24 9.43	2.1603	9 42 6.0	9.241
15	14 26 19.05	2.1603	9 51 18.7	9.182
16	14 28 28.67	2.1604	10 0 27.8	9.122
17	14 30 38.30	2.1606	10 9 33.3	9.061
18	14 32 47.94	2.1608	10 18 35.1	8.999
19	14 34 57.59	2.1609	10 27 33.2	8.937
20	14 37 7.25	2.1611	10 36 27.6	8.875
21	14 39 16.92	2.1613	10 45 18.2	8.812
22	14 41 26.61	2.1616	10 54 5.0	8.748
23	14 43 36.31	2.1618	S. 11 2 47.9	8.684

SATURDAY 10.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
0	14 45 46.02	2.1620	S. 11 11 27.0	8.619
1	14 47 55.75	2.1623	11 20 2.2	8.552
2	14 50 5.50	2.1627	11 28 33.3	8.485
3	14 52 15.27	2.1630	11 37 0.4	8.418
4	14 54 25.06	2.1633	11 45 23.5	8.351
5	14 56 34.87	2.1637	11 53 42.5	8.282
6	14 58 44.71	2.1641	12 1 57.4	8.213
7	15 0 54.57	2.1645	12 10 8.1	8.143
8	15 3 4.45	2.1649	12 18 14.6	8.074
9	15 5 14.36	2.1653	12 26 17.0	8.004
10	15 7 24.29	2.1657	12 34 15.1	7.932
11	15 9 34.25	2.1662	12 42 8.9	7.860
12	15 11 44.24	2.1667	12 49 58.3	7.788
13	15 13 54.26	2.1672	12 57 43.4	7.715
14	15 16 4.30	2.1676	13 5 24.1	7.641
15	15 18 14.37	2.1681	13 13 0.3	7.567
16	15 20 24.47	2.1686	13 20 32.1	7.492
17	15 22 34.60	2.1692	13 27 59.4	7.417
18	15 24 44.77	2.1697	13 35 22.1	7.341
19	15 26 54.96	2.1701	13 42 40.3	7.265
20	15 29 5.18	2.1706	13 49 53.9	7.188
21	15 31 15.44	2.1712	13 57 2.9	7.111
22	15 33 25.73	2.1717	14 4 7.2	7.033
23	15 35 36.05	2.1722	14 11 6.9	6.956
24	15 37 46.40	2.1727	S. 14 18 1.9	6.877

SUNDAY 11.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
	h m s	s	° ′ ″	″
0	15 37 46.40	2.1727	S. 14 18 1.9	6.877
1	15 39 56.78	2.1733	14 24 52.1	6.797
2	15 42 7.20	2.1739	14 31 37.5	6.717
3	15 44 17.65	2.1744	14 38 18.1	6.637
4	15 46 28.13	2.1749	14 44 53.9	6.556
5	15 48 38.64	2.1754	14 51 24.8	6.475
6	15 50 49.18	2.1759	14 57 50.9	6.394
7	15 52 59.75	2.1764	15 4 12.1	6.311
8	15 55 10.35	2.1770	15 10 28.3	6.228
9	15 57 20.99	2.1776	15 16 39.5	6.145
10	15 59 31.66	2.1781	15 22 45.7	6.062
11	16 1 42.36	2.1785	15 28 46.9	5.978
12	16 3 53.08	2.1790	15 34 43.1	5.894
13	16 6 3.84	2.1796	15 40 34.2	5.809
14	16 8 14.63	2.1800	15 46 20.2	5.724
15	16 10 25.44	2.1803	15 52 1.1	5.638
16	16 12 36.27	2.1807	15 57 36.8	5.553
17	16 14 47.13	2.1812	16 3 7.4	5.467
18	16 16 58.02	2.1817	16 8 32.8	5.380
19	16 19 8.94	2.1821	16 13 53.0	5.293
20	16 21 19.88	2.1825	16 19 8.0	5.206
21	16 23 30.84	2.1829	16 24 17.7	5.118
22	16 25 41.83	2.1833	16 29 22.1	5.030
23	16 27 52.84	2.1837	S. 16 34 21.2	4.941

MONDAY 12.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
0	16 30 3.87	2.1840	S. 16 39 15.1	4.853
1	16 32 14.92	2.1843	16 44 3.6	4.763
2	16 34 25.99	2.1846	16 48 46.7	4.674
3	16 36 37.08	2.1849	16 53 24.5	4.585
4	16 38 48.18	2.1852	16 57 56.9	4.495
5	16 40 59.30	2.1854	17 2 23.9	4.405
6	16 43 10.43	2.1856	17 6 45.5	4.315
7	16 45 21.57	2.1858	17 11 1.7	4.224
8	16 47 32.73	2.1861	17 15 12.4	4.132
9	16 49 43.90	2.1862	17 19 17.6	4.041
10	16 51 55.08	2.1863	17 23 17.3	3.950
11	16 54 6.26	2.1864	17 27 11.6	3.858
12	16 56 17.45	2.1865	17 31 0.4	3.767
13	16 58 28.64	2.1866	17 34 43.6	3.674
14	17 0 39.84	2.1867	17 38 21.3	3.582
15	17 2 51.04	2.1867	17 41 53.5	3.490
16	17 5 2.24	2.1867	17 45 20.1	3.397
17	17 7 13.44	2.1867	17 48 41.1	3.304
18	17 9 24.64	2.1866	17 51 56.6	3.212
19	17 11 35.83	2.1865	17 55 6.5	3.118
20	17 13 47.02	2.1864	17 58 10.8	3.025
21	17 15 58.20	2.1863	18 1 9.5	2.931
22	17 18 9.37	2.1861	18 4 2.5	2.837
23	17 20 20.53	2.1858	18 6 49.9	2.743
24	17 22 31.67	2.1856	S. 18 9 31.7	2.649

GREENWICH MEAN TIME.

THE MOON'S RIGHT ASCENSION AND DECLINATION.

SATURDAY 17.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
	h m s	s	° ′ ″	″
0	20 46 37.75	2.0280	S. 15 26 45.4	5.590
1	20 48 39.35	2.0254	15 21 8.0	5.657
2	20 50 40.80	2.0230	15 15 26.6	5.723
3	20 52 42.11	2.0207	15 9 41.3	5.788
4	20 54 43.28	2.0183	15 3 52.0	5.853
5	20 56 44.30	2.0158	14 57 58.9	5.918
6	20 58 45.17	2.0133	14 52 1.9	5.982
7	21 0 45.89	2.0108	14 46 1.1	6.045
8	21 2 46.47	2.0084	14 39 56.5	6.108
9	21 4 46.90	2.0059	14 33 48.1	6.171
10	21 6 47.18	2.0035	14 27 36.0	6.232
11	21 8 47.32	2.0011	14 21 20.2	6.293
12	21 10 47.31	1.9987	14 15 0.8	6.354
13	21 12 47.16	1.9962	14 8 37.7	6.414
14	21 14 46.86	1.9938	14 2 11.1	6.473
15	21 16 46.42	1.9915	13 55 40.9	6.532
16	21 18 45.84	1.9892	13 49 7.2	6.591
17	21 20 45.12	1.9868	13 42 30.0	6.649
18	21 22 44.26	1.9844	13 35 49.3	6.707
19	21 24 43.25	1.9821	13 29 5.2	6.763
20	21 26 42.11	1.9798	13 22 17.7	6.819
21	21 28 40.83	1.9775	13 15 26.9	6.875
22	21 30 39.41	1.9752	13 8 32.7	6.931
23	21 32 37.86	1.9730	S. 13 1 35.2	6.985

SUNDAY 18.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
0	21 34 36.17	1.9707	S. 12 54 34.5	7.038
1	21 36 34.35	1.9685	12 47 30.6	7.092
2	21 38 32.39	1.9663	12 40 23.5	7.145
3	21 40 30.30	1.9641	12 33 13.2	7.197
4	21 42 28.08	1.9619	12 25 59.8	7.249
5	21 44 25.73	1.9597	12 18 43.3	7.300
6	21 46 23.25	1.9576	12 11 23.8	7.350
7	21 48 20.64	1.9555	12 4 1.3	7.400
8	21 50 17.91	1.9534	11 56 35.8	7.450
9	21 52 15.05	1.9513	11 49 7.3	7.499
10	21 54 12.07	1.9492	11 41 35.9	7.547
11	21 56 8.96	1.9472	11 34 1.6	7.595
12	21 58 5.73	1.9452	11 26 24.5	7.642
13	22 0 2.38	1.9432	11 18 44.6	7.688
14	22 1 58.92	1.9413	11 11 1.9	7.735
15	22 3 55.34	1.9393	11 3 16.4	7.781
16	22 5 51.64	1.9374	10 55 28.2	7.826
17	22 7 47.83	1.9356	10 47 37.3	7.870
18	22 9 43.91	1.9337	10 39 43.8	7.913
19	22 11 39.88	1.9319	10 31 47.7	7.957
20	22 13 35.74	1.9301	10 23 49.0	8.000
21	22 15 31.49	1.9283	10 15 47.7	8.042
22	22 17 27.14	1.9266	10 7 43.9	8.084
23	22 19 22.69	1.9249	9 59 37.6	8.125
24	22 21 18.13	1.9232	S. 9 51 28.9	8.165

MONDAY 19.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
	h m s	s	° ′ ″	″
0	22 21 18.13	1.9232	S. 9 51 28.9	8.165
1	22 23 13.47	1.9215	9 43 17.8	8.205
2	22 25 8.71	1.9199	9 35 4.3	8.245
3	22 27 3.86	1.9184	9 26 48.4	8.284
4	22 28 58.92	1.9168	9 18 30.2	8.322
5	22 30 53.88	1.9152	9 10 9.8	8.359
6	22 32 48.75	1.9137	9 1 47.1	8.397
7	22 34 43.53	1.9122	8 53 22.2	8.433
8	22 36 38.22	1.9108	8 44 55.1	8.469
9	22 38 32.83	1.9095	8 36 25.9	8.505
10	22 40 27.36	1.9082	8 27 54.5	8.540
11	22 42 21.81	1.9068	8 19 21.1	8.574
12	22 44 16.18	1.9056	8 10 45.6	8.608
13	22 46 10.48	1.9043	8 2 8.1	8.642
14	22 48 4.70	1.9030	7 53 28.6	8.675
15	22 49 58.84	1.9018	7 44 47.1	8.707
16	22 51 52.91	1.9007	7 36 3.7	8.739
17	22 53 46.92	1.8996	7 27 18.4	8.770
18	22 55 40.86	1.8984	7 18 31.3	8.801
19	22 57 34.73	1.8974	7 9 42.3	8.831
20	22 59 28.55	1.8965	7 0 51.6	8.860
21	23 1 22.31	1.8955	6 51 59.1	8.889
22	23 3 16.01	1.8946	6 43 4.9	8.918
23	23 5 9.66	1.8937	S. 6 34 9.0	8.947

TUESDAY 20.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
0	23 7 3.25	1.8928	S. 6 25 11.3	8.975
1	23 8 56.79	1.8920	6 16 12.0	9.001
2	23 10 50.29	1.8912	6 7 11.2	9.027
3	23 12 43.74	1.8905	5 58 8.8	9.053
4	23 14 37.15	1.8898	5 49 4.8	9.079
5	23 16 30.52	1.8892	5 39 59.3	9.103
6	23 18 23.86	1.8887	5 30 52.4	9.127
7	23 20 17.16	1.8881	5 21 44.0	9.151
8	23 22 10.43	1.8876	5 12 34.2	9.174
9	23 24 3.67	1.8871	5 3 23.1	9.197
10	23 25 56.88	1.8866	4 54 10.6	9.219
11	23 27 50.06	1.8862	4 44 56.8	9.241
12	23 29 43.22	1.8859	4 35 41.7	9.262
13	23 31 36.37	1.8856	4 26 25.3	9.283
14	23 33 29.50	1.8853	4 17 7.7	9.303
15	23 35 22.61	1.8851	4 7 49.0	9.322
16	23 37 15.71	1.8849	3 58 29.1	9.341
17	23 39 8.80	1.8848	3 49 8.1	9.359
18	23 41 1.89	1.8847	3 39 46.0	9.377
19	23 42 54.97	1.8847	3 30 22.8	9.395
20	23 44 48.05	1.8847	3 20 58.6	9.412
21	23 46 41.14	1.8848	3 11 33.4	9.428
22	23 48 34.23	1.8849	3 2 7.3	9.443
23	23 50 27.33	1.8850	2 52 40.2	9.459
24	23 52 20.43	1.8851	S. 2 43 12.2	9.473

GREENWICH MEAN TIME.

THE MOON'S RIGHT ASCENSION AND DECLINATION.

WEDNESDAY 21.

Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
h m s	s	° ′ ″	″
23 52 20.43	1.8851	S. 2 43 12.2	9.473
23 54 13.54	1.8854	2 33 43.4	9.488
23 56 6.68	1.8858	2 24 13.7	9.502
23 57 59.84	1.8862	2 14 43.2	9.515
23 59 53.02	1.8865	2 5 11.9	9.527
0 1 46.22	1.8869	1 55 39.9	9.539
0 3 39.45	1.8874	1 46 7.2	9.551
0 5 32.71	1.8879	1 36 33.8	9.562
0 7 26.00	1.8885	1 26 59.8	9.572
0 9 19.33	1.8892	1 17 25.2	9.582
0 11 12.70	1.8899	1 7 50.0	9.591
0 13 6.11	1.8906	0 58 14.3	9.600
0 14 59.57	1.8913	0 48 38.0	9.608
0 16 53.07	1.8922	0 39 1.3	9.616
0 18 46.63	1.8931	0 29 24.1	9.623
0 20 40.24	1.8939	0 19 46.5	9.630
0 22 33.90	1.8948	0 10 8.5	9.636
0 24 27.62	1.8959	S. 0 0 30.2	9.641
0 26 21.41	1.8970	N. 0 9 8.4	9.646
0 28 15.26	1.8981	0 18 47.3	9.651
0 30 9.18	1.8992	0 28 26.5	9.655
0 32 3.17	1.9005	0 38 5.9	9.658
0 33 57.24	1.9018	0 47 45.5	9.661
0 35 51.39	1.9031	N. 0 57 25.2	9.663

THURSDAY 22.

Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
0 37 45.61	1.9044	N. 1 7 5.0	9.664
0 39 39.92	1.9059	1 16 44.9	9.665
0 41 34.32	1.9073	1 26 24.8	9.666
0 43 28.80	1.9088	1 36 4.8	9.666
0 45 23.38	1.9105	1 45 44.7	9.665
0 47 18.06	1.9122	1 55 24.6	9.664
0 49 12.84	1.9139	2 5 4.4	9.663
0 51 7.72	1.9156	2 14 44.1	9.661
0 53 2.71	1.9173	2 24 23.6	9.657
0 54 57.80	1.9192	2 34 2.9	9.652
0 56 53.01	1.9211	2 43 41.9	9.648
0 58 48.33	1.9230	2 53 20.7	9.644
1 0 43.77	1.9250	3 2 59.2	9.638
1 2 39.33	1.9271	3 12 37.3	9.633
1 4 35.02	1.9292	3 22 15.1	9.627
1 6 30.83	1.9313	3 31 52.5	9.619
1 8 26.78	1.9336	3 41 29.4	9.611
1 10 22.86	1.9359	3 51 5.8	9.603
1 12 19.08	1.9382	4 0 41.7	9.594
1 14 15.44	1.9405	4 10 17.1	9.584
1 16 11.94	1.9429	4 19 51.8	9.573
1 18 8.59	1.9454	4 29 25.9	9.562
1 20 5.39	1.9479	4 38 59.3	9.551
1 22 2.34	1.9505	4 48 32.0	9.538
1 23 59.45	1.9532	N. 4 58 3.9	9.525

FRIDAY 23.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
	h m s	s	° ′ ″	″
0	1 23 59.45	1.9532	N. 4 58 3.9	9.525
1	1 25 56.72	1.9558	5 7 35.0	9.512
2	1 27 54.15	1.9585	5 17 5.3	9.498
3	1 29 51.74	1.9613	5 26 34.8	9.483
4	1 31 49.50	1.9642	5 36 3.3	9.468
5	1 33 47.44	1.9672	5 45 30.9	9.452
6	1 35 45.56	1.9701	5 54 57.5	9.436
7	1 37 43.85	1.9730	6 4 23.1	9.417
8	1 39 42.32	1.9761	6 13 47.6	9.399
9	1 41 40.98	1.9792	6 23 11.0	9.380
10	1 43 39.83	1.9824	6 32 33.2	9.360
11	1 45 38.87	1.9856	6 41 54.2	9.340
12	1 47 38.10	1.9888	6 51 14.0	9.319
13	1 49 37.53	1.9921	7 0 32.5	9.297
14	1 51 37.16	1.9955	7 9 49.7	9.275
15	1 53 36.99	1.9989	7 19 5.5	9.252
16	1 55 37.03	2.0024	7 28 19.9	9.228
17	1 57 37.28	2.0059	7 37 32.8	9.203
18	1 59 37.74	2.0095	7 46 44.3	9.178
19	2 1 38.42	2.0132	7 55 54.2	9.152
20	2 3 39.32	2.0168	8 5 2.5	9.125
21	2 5 40.44	2.0205	8 14 9.2	9.097
22	2 7 41.78	2.0243	8 23 14.2	9.069
23	2 9 43.35	2.0281	N. 8 32 17.5	9.040

SATURDAY 24.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
0	2 11 45.15	2.0320	N. 8 41 19.0	9.010
1	2 13 47.19	2.0359	8 50 18.7	8.979
2	2 15 49.46	2.0398	8 59 16.5	8.948
3	2 17 51.97	2.0438	9 8 12.4	8.916
4	2 19 54.72	2.0479	9 17 6.4	8.882
5	2 21 57.72	2.0520	9 25 58.3	8.848
6	2 24 0.96	2.0562	9 34 48.2	8.814
7	2 26 4.46	2.0604	9 43 36.0	8.778
8	2 28 8.21	2.0646	9 52 21.6	8.742
9	2 30 12.21	2.0688	10 1 5.1	8.706
10	2 32 16.47	2.0732	10 9 46.3	8.667
11	2 34 21.00	2.0776	10 18 25.1	8.628
12	2 36 25.79	2.0820	10 27 1.6	8.588
13	2 38 30.84	2.0865	10 35 35.7	8.548
14	2 40 36.17	2.0911	10 44 7.4	8.507
15	2 42 41.77	2.0957	10 52 36.6	8.465
16	2 44 47.65	2.1003	11 1 3.2	8.421
17	2 46 53.80	2.1048	11 9 27.1	8.376
18	2 49 0.23	2.1095	11 17 48.3	8.331
19	2 51 6.94	2.1143	11 26 6.8	8.286
20	2 53 13.94	2.1191	11 34 22.6	8.240
21	2 55 21.23	2.1239	11 42 35.6	8.192
22	2 57 28.81	2.1287	11 50 45.7	8.143
23	2 59 36.68	2.1336	11 58 52.8	8.093
24	3 1 44.84	2.1385	N. 12 6 56.9	8.043

GREENWICH MEAN TIME.

THE MOON'S RIGHT ASCENSION AND DECLINATION.

SUNDAY 25.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
	h m s	s	° ′ ″	″
0	3 1 44.84	2.1385	N.12 6 56.9	8.043
1	3 3 53.30	2.1435	12 14 58.0	7.992
2	3 6 2.06	2.1485	12 22 56.0	7.940
3	3 8 11.12	2.1535	12 30 50.8	7.887
4	3 10 20.48	2.1585	12 38 42.4	7.832
5	3 12 30.14	2.1636	12 46 30.7	7.777
6	3 14 40.11	2.1687	12 54 15.6	7.720
7	3 16 50.39	2.1739	13 1 57.1	7.663
8	3 19 0.98	2.1791	13 9 35.2	7.606
9	3 21 11.88	2.1843	13 17 9.8	7.547
10	3 23 23.09	2.1895	13 24 40.8	7.487
11	3 25 34.62	2.1947	13 32 8.2	7.426
12	3 27 46.46	2.2000	13 39 31.9	7.364
13	3 29 58.62	2.2053	13 46 51.8	7.301
14	3 32 11.10	2.2107	13 54 8.0	7.237
15	3 34 23.91	2.2161	14 1 20.3	7.172
16	3 36 37.04	2.2215	14 8 28.6	7.105
17	3 38 50.49	2.2268	14 15 32.9	7.038
18	3 41 4.26	2.2322	14 22 33.2	6.971
19	3 43 18.36	2.2377	14 29 29.4	6.902
20	3 45 32.79	2.2432	14 36 21.4	6.831
21	3 47 47.55	2.2487	14 43 9.1	6.759
22	3 50 2.64	2.2542	14 49 52.5	6.687
23	3 52 18.06	2.2597	N.14 56 31.6	6.615

MONDAY 26.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
0	3 54 33.80	2.2652	N.15 3 6.3	6.541
1	3 56 49.88	2.2707	15 9 36.5	6.465
2	3 59 6.29	2.2762	15 16 2.1	6.388
3	4 1 23.03	2.2817	15 22 23.1	6.311
4	4 3 40.10	2.2873	15 28 39.4	6.232
5	4 5 57.51	2.2929	15 34 51.0	6.152
6	4 8 15.25	2.2984	15 40 57.7	6.072
7	4 10 33.32	2.3040	15 46 59.6	5.991
8	4 12 51.73	2.3096	15 52 56.6	5.907
9	4 15 10.47	2.3151	15 58 48.5	5.823
10	4 17 29.54	2.3207	16 4 35.4	5.739
11	4 19 48.95	2.3262	16 10 17.2	5.652
12	4 22 8.69	2.3317	16 15 53.7	5.565
13	4 24 28.76	2.3372	16 21 25.0	5.477
14	4 26 49.16	2.3428	16 26 51.0	5.388
15	4 29 9.90	2.3484	16 32 11.6	5.298
16	4 31 30.97	2.3539	16 37 26.7	5.207
17	4 33 52.37	2.3593	16 42 36.4	5.115
18	4 36 14.09	2.3647	16 47 40.5	5.021
19	4 38 36.14	2.3702	16 52 38.9	4.927
20	4 40 58.52	2.3757	16 57 31.7	4.832
21	4 43 21.22	2.3811	17 2 18.7	4.734
22	4 45 44.25	2.3865	17 6 59.8	4.636
23	4 48 7.60	2.3918	17 11 35.1	4.538
24	4 50 31.27	2.3972	N.17 16 4.4	4.438

TUESDAY 27.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
	h m s	s	° ′ ″	″
0	4 50 31.27	2.3972	N.17 16 4.4	4.438
1	4 52 55.26	2.4025	17 20 27.7	4.336
2	4 55 19.57	2.4077	17 24 45.0	4.237
3	4 57 44.19	2.4129	17 28 56.1	4.134
4	5 0 9.13	2.4182	17 33 1.0	4.030
5	5 2 34.37	2.4233	17 36 59.7	3.925
6	5 4 59.92	2.4284	17 40 52.0	3.819
7	5 7 25.78	2.4335	17 44 38.0	3.713
8	5 9 51.94	2.4386	17 48 17.6	3.605
9	5 12 18.41	2.4437	17 51 50.6	3.496
10	5 14 45.18	2.4486	17 55 17.1	3.387
11	5 17 12.24	2.4535	17 58 37.0	3.277
12	5 19 39.60	2.4584	18 1 50.3	3.166
13	5 22 7.25	2.4632	18 4 56.9	3.053
14	5 24 35.18	2.4679	18 7 56.7	2.939
15	5 27 3.40	2.4726	18 10 49.6	2.824
16	5 29 31.90	2.4773	18 13 35.6	2.709
17	5 32 0.68	2.4819	18 16 14.7	2.594
18	5 34 29.73	2.4864	18 18 46.9	2.477
19	5 36 59.05	2.4908	18 21 12.0	2.360
20	5 39 28.63	2.4952	18 23 30.1	2.242
21	5 41 58.48	2.4996	18 25 41.0	2.122
22	5 44 28.59	2.5039	18 27 44.7	2.002
23	5 46 58.95	2.5081	N.18 29 41.2	1.881

WEDNESDAY 28.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
0	5 49 29.56	2.5122	N.18 31 30.4	1.759
1	5 52 0.41	2.5163	18 33 12.3	1.637
2	5 54 31.51	2.5203	18 34 46.8	1.514
3	5 57 2.85	2.5242	18 36 14.0	1.391
4	5 59 34.42	2.5280	18 37 33.7	1.266
5	6 2 6.21	2.5317	18 38 45.9	1.141
6	6 4 38.23	2.5354	18 39 50.6	1.015
7	6 7 10.46	2.5390	18 40 47.7	0.888
8	6 9 42.91	2.5426	18 41 37.2	0.762
9	6 12 15.57	2.5460	18 42 19.1	0.634
10	6 14 48.43	2.5493	18 42 53.3	0.506
11	6 17 21.49	2.5526	18 43 19.8	0.377
12	6 19 54.74	2.5557	18 43 38.6	0.248
13	6 22 28.17	2.5588	18 43 49.6	+ 0.118
14	6 25 1.79	2.5618	18 43 52.8	− 0.012
15	6 27 35.59	2.5647	18 43 48.1	0.143
16	6 30 9.56	2.5675	18 43 35.6	0.274
17	6 32 43.69	2.5702	18 43 15.2	0.405
18	6 35 17.98	2.5728	18 42 47.0	0.537
19	6 37 52.42	2.5753	18 42 10.8	0.669
20	6 40 27.01	2.5778	18 41 26.7	0.802
21	6 43 1.75	2.5802	18 40 34.6	0.935
22	6 45 36.63	2.5824	18 39 34.5	1.068
23	6 48 11.64	2.5845	18 38 26.4	1.202
24	6 50 46.77	2.5865	N.18 37 10.3	1.336

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Name and Direction of Object.		Noon.	P. L. of Diff.	III^h.	P. L. of Diff.	VI^h.	P. L. of Diff.	IX^h.	P. L. of Diff.
3	Sun	W.	22° 6′ 5″	2443	23° 48′ 38″	2433	25° 31′ 26″	2425	27° 14′ 25″	2419
	Jupiter	E.	55 16 12	2105	53 25 20	2105	51 34 28	2105	49 43 37	2107
	Mars	E.	57 40 1	2229	55 52 16	2229	54 4 32	2231	52 16 50	2232
	Spica	E.	78 50 33	2092	76 59 22	2094	75 8 13	2095	73 17 6	2097
4	Sun	W.	35 50 34	2415	37 33 48	2417	39 16 59	2420	41 0 5	2425
	Jupiter	E.	40 30 18	2124	38 39 55	2129	36 49 40	2134	34 59 33	2141
	Mars	E.	43 19 17	2251	41 32 5	2256	39 45 1	2263	37 58 7	2270
	Spica	E.	64 2 35	2116	62 12 0	2122	60 21 34	2128	58 31 18	2136
	Antares	E.	109 46 45	2160	107 57 17	2163	106 7 54	2167	104 18 37	2172
5	Sun	W.	49 33 40	2456	51 15 55	2465	52 57 58	2474	54 39 48	2483
	Mars	E.	29 6 22	2312	27 20 40	2323	25 35 14	2334	23 50 4	2346
	Spica	E.	49 22 59	2180	47 34 1	2191	45 45 20	2202	43 56 56	2214
	Antares	E.	95 14 23	2206	93 26 4	2214	91 37 57	2223	89 50 4	2233
6	Sun	W.	63 5 34	2535	64 45 59	2546	66 26 8	2558	68 6 1	2569
	Regulus	W.	19 7 24	2233	20 55 3	2242	22 42 28	2252	24 29 38	2262
	Spica	E.	34 59 52	2288	33 13 35	2306	31 27 44	2325	29 42 21	2346
	Antares	E.	80 54 21	2286	79 8 1	2298	77 21 59	2310	75 36 14	2323
7	Sun	W.	76 21 14	2633	77 59 24	2646	79 37 17	2659	81 14 52	2672
	Regulus	W.	33 21 27	2320	35 6 58	2332	36 52 11	2344	38 37 7	2356
	Antares	E.	66 52 15	2391	65 8 27	2405	63 24 59	2420	61 41 53	2435
8	Sun	W.	89 18 22	2730	90 54 10	2752	92 29 41	2766	94 4 54	2779
	Regulus	W.	47 17 19	2418	49 0 28	2430	50 43 20	2443	52 25 54	2455
	Jupiter	W.	16 32 18	2456	18 14 33	2469	19 56 30	2481	21 38 10	2493
	Antares	E.	53 11 52	2516	51 31 1	2533	49 50 34	2551	48 10 32	2570
	α Aquilæ	E.	101 12 50	2898	99 40 29	2905	98 8 17	2914	96 36 16	2924
9	Sun	W.	101 56 40	2845	103 30 10	2858	105 3 23	2871	106 36 19	2883
	Regulus	W.	60 54 24	2516	62 35 15	2527	64 15 50	2540	65 56 8	2551
	Jupiter	W.	30 2 10	2555	31 42 7	2567	33 21 47	2580	35 1 10	2591
	Mars	W.	25 15 32	2704	26 52 6	2715	28 28 26	2726	30 4 31	2738
	Antares	E.	39 57 4	2675	38 19 50	2698	36 43 8	2725	35 7 1	2753
	α Aquilæ	E.	88 59 24	2980	87 28 46	2993	85 58 25	3007	84 28 21	3021
10	Sun	W.	114 16 59	2946	115 48 20	2958	117 19 25	2970	118 50 15	2981
	Regulus	W.	74 13 38	2609	75 52 21	2619	77 30 50	2630	79 9 4	2641
	Jupiter	W.	43 14 6	2649	44 51 54	2660	46 29 27	2672	48 6 45	2682
	Mars	W.	38 1 5	2796	39 35 38	2807	41 9 57	2818	42 44 2	2828
	Spica	W.	21 15 15	2758	22 50 38	2750	24 26 12	2745	26 1 52	2744
	α Aquilæ	E.	77 2 42	3103	75 34 36	3121	74 6 52	3141	72 39 32	3161
11	Sun	W.	126 20 48	3039	127 50 12	3051	129 19 22	3062	130 48 18	3073
	Regulus	W.	87 16 38	2692	88 53 28	2703	90 30 4	2713	92 6 27	2722
	Jupiter	W.	56 9 40	2735	57 45 33	2745	59 21 13	2755	60 56 40	2765
	Mars	W.	50 30 54	2882	52 3 36	2893	53 36 4	2903	55 8 19	2913
	Spica	W.	34 0 6	2756	35 35 32	2760	37 10 52	2766	38 46 4	2772
	α Aquilæ	E.	65 29 13	3276	64 4 33	3301	62 40 23	3329	61 16 45	3358
	Fomalhaut	E.	98 2 53	3014	96 32 57	3021	95 3 10	3029	93 33 33	3038

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Name and Direction of Object.		Noon.	P. L. of Diff.	IIIh.	P. L. of Diff.	VIh.	P. L. of Diff.	IXh.	P. L. of Diff.
12	Regulus	W.	100 5′ 14″	2769	101 40′ 23″	2778	103 15′ 20″	2786	104 50′ 6″	2795
	Jupiter	W.	68 50 43	2812	70 24 55	2821	71 58 55	2830	73 32 44	2839
	Mars	W.	62 46 24	2962	64 17 24	2971	65 48 13	2981	67 18 50	2989
	Spica	W.	46 39 59	2805	48 14 20	2813	49 48 31	2820	51 22 33	2827
	α Aquilæ	E.	54 27 31	3531	53 7 41	3572	51 48 36	3617	50 30 20	3664
	Fomalhaut	E.	86 8 16	3086	84 39 49	3096	83 11 34	3106	81 43 32	3118
13	Jupiter	W.	81 18 59	2881	82 51 42	2890	84 24 14	2898	85 56 36	2905
	Mars	W.	74 49 8	3034	76 18 39	3042	77 48 0	3050	79 17 11	3059
	Spica	W.	59 10 24	2863	60 43 30	2870	62 16 27	2877	63 49 15	2883
	α Aquilæ	E.	44 12 57	3965	43 0 43	4043	41 49 46	4128	40 40 11	4219
	Fomalhaut	E.	74 26 56	3179	73 0 22	3193	71 34 5	3208	70 8 5	3222
	α Pegasi	E.	89 7 39	3121	87 39 55	3129	86 12 21	3138	84 44 57	3147
14	Jupiter	W.	93 35 59	2943	95 7 23	2950	96 38 38	2958	98 9 44	2965
	Mars	W.	86 40 35	3098	88 8 47	3105	89 36 50	3113	91 4 44	3121
	Spica	W.	71 31 3	2919	73 2 58	2925	74 34 45	2932	76 6 23	2939
	Antares	W.	26 56 2	3202	28 22 9	3180	29 48 42	3163	31 15 36	3148
	Fomalhaut	E.	63 2 38	3306	61 38 34	3325	60 14 52	3345	58 51 32	3365
	α Pegasi	E.	77 30 53	3198	76 4 42	3209	74 38 44	3221	73 13 0	3232
15	Mars	W.	98 22 0	3156	99 49 2	3163	101 15 56	3169	102 42 42	3176
	Spica	W.	83 42 31	2970	85 13 21	2977	86 44 3	2983	88 14 37	2989
	Antares	W.	38 33 30	3109	40 1 29	3105	41 29 32	3103	42 57 38	3101
	Fomalhaut	E.	52 1 24	3493	50 40 52	3523	49 20 53	3555	48 1 29	3589
	α Pegasi	E.	66 8 0	3300	64 43 49	3315	63 19 55	3332	61 56 20	3348
16	Spica	W.	95 45 38	3018	97 15 29	3022	98 45 14	3028	100 14 52	3034
	Antares	W.	50 18 26	3101	51 46 35	3102	53 14 42	3103	54 42 48	3105
	Fomalhaut	E.	41 35 2	3813	40 20 13	3871	39 6 24	3934	37 53 39	4005
	α Pegasi	E.	55 3 31	3446	53 42 7	3469	52 21 8	3493	51 0 36	3519
	α Arietis	E.	97 26 46	3135	95 59 19	3140	94 31 58	3144	93 4 42	3149
17	Antares	W.	62 2 47	3114	63 30 40	3116	64 58 30	3118	66 26 18	3120
	α Pegasi	E.	44 25 52	3683	43 8 47	3724	41 52 25	3769	40 36 51	3819
	α Arietis	E.	85 49 48	3173	84 23 6	3178	82 56 30	3183	81 30 0	3187
18	Antares	W.	73 44 42	3129	75 12 16	3130	76 39 49	3131	78 7 21	3133
	α Aquilæ	W.	34 37 20	4967	35 34 41	4833	36 33 50	4714	37 34 38	4606
	α Arietis	E.	74 18 54	3211	72 52 58	3216	71 27 8	3220	70 1 23	3225
	Aldebaran	E.	106 30 33	3061	105 1 36	3064	103 32 42	3065	102 3 50	3067
19	Antares	W.	85 24 39	3136	86 52 5	3137	88 19 30	3137	89 46 55	3136
	α Aquilæ	W.	42 59 15	4206	44 7 35	4147	45 16 51	4093	46 26 59	4044
	α Arietis	E.	62 54 8	3251	61 28 59	3257	60 3 57	3262	58 39 1	3267
	Aldebaran	E.	94 40 0	3073	93 11 17	3073	91 42 34	3073	90 13 52	3073
	Sun	E.	143 7 37	3461	141 46 29	3460	140 25 20	3459	139 4 10	3457
20	Antares	W.	97 4 14	3131	98 31 46	3129	99 59 20	3127	101 26 57	3124
	α Aquilæ	W.	52 28 41	3847	53 42 55	3815	54 57 42	3786	56 12 59	3758
	α Arietis	E.	51 36 7	3300	50 11 56	3309	48 47 55	3318	47 24 4	3327
	Aldebaran	E.	82 50 8	3067	81 21 18	3065	79 52 25	3061	78 23 28	3059

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Name and Direction of Object.		Noon.	P. L. of Diff.	IIIh.	P. L. of Diff.	VIh.	P. L. of Diff.	IXh.	P. L. of Diff.
20	Venus	E.	98° 23′ 10″	3533	97° 3′ 22″	3530	95° 43′ 31″	3527	94° 23′ 37″	3524
	Sun	E.	132 17 47	3445	130 56 21	3442	129 34 52	3439	128 13 20	3436
21	α Aquilæ	W.	62 36 12	3639	63 54 4	3619	65 12 18	3599	66 30 53	3580
	α Arietis	E.	40 27 58	3393	39 5 35	3410	37 43 30	3431	36 21 49	3455
	Aldebaran	E.	70 57 41	3038	69 28 15	3033	67 58 43	3027	66 29 4	3021
	Venus	E.	87 43 3	3501	86 22 40	3496	85 2 11	3489	83 41 35	3483
	Sun	E.	121 24 26	3411	120 2 22	3404	118 40 10	3398	117 17 51	3391
22	α Aquilæ	W.	73 8 48	3494	74 29 19	3478	75 50 8	3462	77 11 15	3446
	Fomalhaut	W.	40 17 45	3803	41 32 44	3746	42 48 42	3694	44 5 35	3646
	Aldebaran	E.	58 58 43	2984	57 28 10	2976	55 57 27	2967	54 26 33	2957
	Venus	E.	76 56 35	3443	75 35 7	3433	74 13 28	3424	72 51 39	3414
	Saturn	E.	95 13 36	3040	93 44 13	3031	92 14 39	3022	90 44 53	3012
	Sun	E.	110 24 8	3350	109 0 54	3340	107 37 29	3331	106 13 53	3320
23	α Aquilæ	W.	84 1 2	3373	85 23 49	3359	86 46 52	3346	88 10 10	3332
	Fomalhaut	W.	50 42 1	3446	52 3 26	3411	53 25 30	3379	54 48 11	3348
	α Pegasi	W.	36 54 15	3785	38 9 33	3715	39 26 4	3650	40 43 44	3590
	Aldebaran	E.	46 48 53	2904	45 16 39	2892	43 44 10	2880	42 11 26	2867
	Venus	E.	65 59 29	3356	64 36 22	3344	63 13 1	3330	61 49 24	3317
	Saturn	E.	83 12 57	2958	81 41 52	2946	80 10 32	2935	78 38 57	2922
	Sun	E.	99 12 42	3262	97 47 46	3248	96 22 34	3235	94 57 6	3222
24	Fomalhaut	W.	61 50 13	3205	63 16 16	3179	64 42 50	3154	66 9 54	3130
	α Pegasi	W.	47 27 4	3346	48 50 22	3306	50 14 27	3267	51 39 17	3231
	Aldebaran	E.	34 23 29	2798	32 48 59	2784	31 14 10	2769	29 39 1	2753
	Venus	E.	54 47 15	3243	53 21 57	3227	51 56 20	3211	50 30 24	3194
	Saturn	E.	70 56 50	2852	69 23 30	2838	67 49 51	2823	66 15 53	2808
	Sun	E.	87 45 35	3147	86 18 22	3130	84 50 49	3114	83 22 56	3097
25	Fomalhaut	W.	73 32 35	3011	75 2 34	2989	76 33 0	2967	78 3 54	2946
	α Pegasi	W.	58 53 52	3065	60 22 44	3035	61 52 13	3006	63 22 18	2979
	Venus	E.	43 15 41	3109	41 47 42	3091	40 19 21	3073	38 50 39	3056
	Saturn	E.	58 20 53	2726	56 44 48	2709	55 8 20	2692	53 31 30	2675
	Sun	E.	75 58 16	3009	74 28 14	2989	72 57 48	2971	71 26 59	2953
26	Fomalhaut	W.	85 45 6	2842	87 18 39	2823	88 52 37	2805	90 26 59	2786
	α Pegasi	W.	71 1 14	2848	72 34 40	2824	74 8 37	2800	75 43 5	2776
	α Arietis	W.	27 58 13	3205	29 24 16	3119	30 52 3	3043	32 21 23	2975
	Venus	E.	31 21 39	2968	29 50 46	2950	28 19 31	2935	26 47 56	2920
	Saturn	E.	45 21 25	2588	43 42 13	2569	42 2 36	2552	40 22 35	2535
	Sun	E.	63 46 48	2855	62 13 31	2835	60 39 48	2815	59 5 39	2795
27	Fomalhaut	W.	98 24 41	2701	100 1 19	2687	101 38 17	2672	103 15 34	2660
	α Pegasi	W.	83 42 52	2669	85 20 14	2649	86 58 2	2630	88 36 16	2611
	α Arietis	W.	40 7 1	2716	41 43 19	2675	43 20 32	2637	44 58 36	2602
	Sun	E.	51 8 27	2696	49 31 42	2677	47 54 31	2658	46 16 55	2639
28	α Pegasi	W.	96 53 26	2530	98 33 57	2517	100 14 47	2504	101 55 54	2492
	α Arietis	W.	53 20 14	2452	55 2 35	2426	56 45 33	2402	58 29 5	2378
	Sun	E.	38 2 35	2549	36 22 30	2533	34 42 2	2517	33 1 12	2501

GREENWICH MEAN TIME.

THE MOON'S

Day of the Month.	SEMIDIAMETER. Noon.	SEMIDIAMETER. Midnight.	HORIZONTAL PARALLAX. Noon.	Diff. for 1 Hour.	HORIZONTAL PARALLAX. Midnight.	Diff. for 1 Hour.	UPPER TRANSIT. Meridian of Greenwich.	Diff. for 1 Hour.	AGE. Noon.
	′ ″	′ ″	′ ″	″	′ ″	″	h m	m	d
1	16 41.7	16 39.7	61 9.6	−0.43	61 2.2	−0.80	1 19.1	2.42	1.3
2	16 36.5	16 32.3	60 50.5	1.13	60 35.0	1.43	2 16.0	2.32	2.3
3	16 27.1	16 21.3	60 16.2	1.68	59 54.8	1.87	3 10.5	2.23	3.3
4	16 14.9	16 8.2	59 31.4	−2.01	59 6.7	−2.10	4 3.1	2.16	4.3
5	16 1.3	15 54.3	58 41.2	2.14	58 15.4	2.14	4 54.4	2.12	5.3
6	15 47.3	15 40.6	57 49.9	2.10	57 25.1	2.03	5 45.0	2.10	6.3
7	15 34.1	15 27.9	57 1.2	−1.94	56 38.5	−1.83	6 35.2	2.10	7.3
8	15 22.1	15 16.7	56 17.2	1.71	55 57.5	1.58	7 25.3	2.09	8.3
9	15 11.8	15 7.2	55 39.3	1.45	55 22.7	1.32	8 15.3	2.08	9.3
10	15 3.2	14 59.5	55 7.7	−1.18	54 54.3	−1.05	9 4.9	2.05	10.3
11	14 56.3	14 53.5	54 42.5	0.92	54 32.2	0.80	9 53.8	2.01	11.3
12	14 51.1	14 49.0	54 23.3	0.68	54 15.8	0.57	10 41.6	1.96	12.3
13	14 47.3	14 46.0	54 9.6	−0.46	54 4.8	−0.35	11 28.0	1.90	13.3
14	14 45.1	14 44.5	54 1.3	0.24	53 59.1	−0.13	12 13.0	1.86	14.3
15	14 44.2	14 44.4	53 58.2	−0.02	53 58.7	+0.10	12 56.9	1.80	15.3
16	14 44.9	14 45.8	54 0.5	+0.21	54 3.8	+0.34	13 39.8	1.78	16.3
17	14 47.1	14 48.8	54 8.6	0.47	54 15.0	0.61	14 22.3	1.77	17.3
18	14 51.0	14 53.7	54 23.2	0.75	54 33.0	0.90	15 5.1	1.79	18.3
19	14 56.9	15 0.6	54 44.7	+1.06	54 58.3	+1.22	15 48.7	1.85	19.3
20	15 4.8	15 9.6	55 13.9	1.38	55 31.4	1.54	16 33.9	1.93	20.3
21	15 14.9	15 20.7	55 50.8	1.70	56 12.2	1.86	17 21.3	2.04	21.3
22	15 27.0	15 33.7	56 35.3	+1.99	57 0.0	+2.11	18 11.7	2.17	22.3
23	15 40.8	15 48.2	57 26.0	2.21	57 53.1	2.29	19 5.2	2.30	23.3
24	15 55.7	16 3.3	58 20.8	2.31	58 48.6	2.30	20 1.6	2.41	24.3
25	16 10.8	16 17.9	59 16.0	+2.24	59 42.4	+2.13	21 0.4	2.48	25.3
26	16 24.6	16 30.7	60 7.0	1.95	60 29.2	1.72	22 0.3	2.50	26.3
27	16 35.9	16 40.0	60 48.2	1.43	61 8.5	1.09	23 0.0	2.47	27.3
28	16 43.0	16 44.7	61 14.4	+0.71	61 20.6	+0.31	23 58.5	2.40	28.3
29	16 45.0	16 44.0	61 21.8	−0.11	61 18.0	−0.53	6		29.3
30	16 41.6	16 38.0	61 9.2	0.92	60 55.9	1.29	0 55.3	2.33	1.0
31	16 33.2	16 27.4	60 38.3	1.61	60 17.3	1.88	1 50.4	2.26	2.0
32	16 20.9	16 13.8	59 53.3	−2.09	59 27.2	−2.24	2 44.1	2.21	3.0

GREENWICH MEAN TIME.

THE MOON'S RIGHT ASCENSION AND DECLINATION.

SUNDAY 1.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
	h m s	s	° ′ ″	″
0	9 56 7.31	2.4930	N.11 35 22.1	9.680
1	9 58 36.78	2.4894	11 25 39.0	9.757
2	10 1 6.03	2.4858	11 15 51.3	9.832
3	10 3 35.07	2.4822	11 5 59.2	9.905
4	10 6 3.89	2.4785	10 56 2.7	9.977
5	10 8 32.49	2.4748	10 46 1.9	10.047
6	10 11 0.87	2.4712	10 35 57.0	10.116
7	10 13 29.03	2.4676	10 25 48.0	10.184
8	10 15 56.98	2.4640	10 15 34.9	10.251
9	10 18 24.71	2.4603	10 5 17.9	10.315
10	10 20 52.22	2.4566	9 54 57.1	10.377
11	10 23 19.50	2.4528	9 44 32.6	10.438
12	10 25 46.55	2.4490	9 34 4.5	10.498
13	10 28 13.38	2.4453	9 23 32.8	10.557
14	10 30 39.99	2.4417	9 12 57.7	10.613
15	10 33 6.38	2.4380	9 2 19.2	10.669
16	10 35 32.55	2.4342	8 51 37.4	10.722
17	10 37 58.49	2.4305	8 40 52.5	10.773
18	10 40 24.21	2.4268	8 30 4.6	10.823
19	10 42 49.71	2.4231	8 19 13.7	10.873
20	10 45 14.98	2.4193	8 8 19.8	10.922
21	10 47 40.03	2.4157	7 57 23.1	10.968
22	10 50 4.86	2.4120	7 46 23.7	11.012
23	10 52 29.47	2.4082	N. 7 35 21.7	11.054

MONDAY 2.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
0	10 54 53.85	2.4045	N. 7 24 17.2	11.095
1	10 57 18.01	2.4009	7 13 10.3	11.135
2	10 59 41.96	2.3973	7 2 1.0	11.174
3	11 2 5.69	2.3937	6 50 49.4	11.212
4	11 4 29.20	2.3901	6 39 35.6	11.247
5	11 6 52.50	2.3865	6 28 19.8	11.279
6	11 9 15.58	2.3829	6 17 2.1	11.311
7	11 11 38.45	2.3793	6 5 42.5	11.342
8	11 14 1.10	2.3757	5 54 21.0	11.372
9	11 16 23.54	2.3722	5 42 57.8	11.400
10	11 18 45.77	2.3687	5 31 33.0	11.427
11	11 21 7.79	2.3653	5 20 6.6	11.452
12	11 23 29.61	2.3619	5 8 38.8	11.474
13	11 25 51.22	2.3584	4 57 9.7	11.496
14	11 28 12.62	2.3549	4 45 39.3	11.517
15	11 30 33.81	2.3515	4 34 7.7	11.536
16	11 32 54.80	2.3482	4 22 35.0	11.553
17	11 35 15.60	2.3450	4 11 1.3	11.569
18	11 37 36.20	2.3417	3 59 26.7	11.584
19	11 39 56.60	2.3384	3 47 51.2	11.597
20	11 42 16.81	2.3352	3 36 15.0	11.609
21	11 44 36.82	2.3319	3 24 38.1	11.619
22	11 46 56.64	2.3287	3 13 0.7	11.628
23	11 49 16.27	2.3256	3 1 22.7	11.637
24	[illegible] 35.71	2.3225	N. 2 49 44.3	11.642

TUESDAY 3.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
	h m s	s	° ′ ″	″
0	11 51 35.71	2.3225	N. 2 49 44.3	11.642
1	11 53 54.97	2.3194	2 38 5.6	11.647
2	11 56 14.04	2.3163	2 26 26.6	11.651
3	11 58 32.93	2.3133	2 14 47.5	11.653
4	12 0 51.64	2.3103	2 3 8.3	11.654
5	12 3 10.17	2.3074	1 51 29.0	11.654
6	12 5 28.53	2.3045	1 39 49.8	11.652
7	12 7 46.71	2.3016	1 28 10.7	11.649
8	12 10 4.72	2.2988	1 16 31.9	11.644
9	12 12 22.57	2.2961	1 4 53.4	11.639
10	12 14 40.25	2.2933	0 53 15.2	11.632
11	12 16 57.76	2.2905	0 41 37.5	11.624
12	12 19 15.11	2.2878	0 30 0.3	11.615
13	12 21 32.30	2.2852	0 18 23.7	11.604
14	12 23 49.33	2.2825	N. 0 6 47.8	11.592
15	12 26 6.20	2.2799	S. 0 4 47.3	11.578
16	12 28 22.92	2.2774	0 16 21.6	11.564
17	12 30 39.49	2.2749	0 27 55.0	11.549
18	12 32 55.91	2.2724	0 39 27.5	11.532
19	12 35 12.18	2.2700	0 50 58.9	11.514
20	12 37 28.31	2.2677	1 2 29.2	11.496
21	12 39 44.30	2.2653	1 13 58.4	11.476
22	12 42 0.15	2.2630	1 25 26.3	11.454
23	12 44 15.86	2.2607	S. 1 36 52.8	11.431

WEDNESDAY 4.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
0	12 46 31.43	2.2584	S. 1 48 18.0	11.408
1	12 48 46.87	2.2562	1 59 41.8	11.383
2	12 51 2.18	2.2541	2 11 4.0	11.357
3	12 53 17.36	2.2520	2 22 24.6	11.329
4	12 55 32.42	2.2499	2 33 43.5	11.301
5	12 57 47.35	2.2478	2 45 0.8	11.273
6	13 0 2.16	2.2458	2 56 16.3	11.243
7	13 2 16.85	2.2438	3 7 29.9	11.212
8	13 4 31.42	2.2419	3 18 41.7	11.180
9	13 6 45.88	2.2401	3 29 51.5	11.146
10	13 9 0.23	2.2382	3 40 59.2	11.112
11	13 11 14.47	2.2364	3 52 4.9	11.077
12	13 13 28.60	2.2347	4 3 8.4	11.040
13	13 15 42.63	2.2329	4 14 9.7	11.003
14	13 17 56.55	2.2312	4 25 8.8	10.965
15	13 20 10.37	2.2296	4 36 5.5	10.925
16	13 22 24.10	2.2280	4 46 59.8	10.885
17	13 24 37.73	2.2263	4 57 51.7	10.844
18	13 26 51.26	2.2247	5 8 41.1	10.802
19	13 29 4.70	2.2232	5 19 27.9	10.759
20	13 31 18.05	2.2218	5 30 12.2	10.716
21	13 33 31.32	2.2204	5 40 53.8	10.670
22	13 35 44.50	2.2190	5 51 32.6	10.624
23	13 37 57.60	2.2177	6 2 8.7	10.578
24	13 40 10.62	2.2163	S. 6 12 42.0	10.531

GREENWICH MEAN TIME.

THE MOON'S RIGHT ASCENSION AND DECLINATION.

FRIDAY 13.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
	h m s	s	° ′ ″	″
0	20 34 2.54	2.0364	S. 15 59 26.7	5.086
1	20 36 4.66	2.0342	15 54 19.5	5.154
2	20 38 6.65	2.0321	15 49 8.2	5.223
3	20 40 8.51	2.0298	15 43 52.7	5.292
4	20 42 10.23	2.0276	15 38 33.1	5.361
5	20 44 11.82	2.0253	15 33 9.4	5.430
6	20 46 13.27	2.0231	15 27 41.5	5.498
7	20 48 14.59	2.0209	15 22 9.6	5.565
8	20 50 15.78	2.0187	15 16 33.7	5.632
9	20 52 16.83	2.0164	15 10 53.8	5.698
10	20 54 17.75	2.0142	15 5 10.0	5.764
11	20 56 18.54	2.0120	14 59 22.2	5.829
12	20 58 19.19	2.0098	14 53 30.5	5.893
13	21 0 19.71	2.0076	14 47 35.0	5.958
14	21 2 20.10	2.0053	14 41 35.6	6.022
15	21 4 20.35	2.0031	14 35 32.4	6.084
16	21 6 20.47	2.0009	14 29 25.5	6.147
17	21 8 20.46	1.9987	14 23 14.8	6.209
18	21 10 20.32	1.9966	14 17 0.4	6.271
19	21 12 20.05	1.9944	14 10 42.3	6.332
20	21 14 19.65	1.9922	14 4 20.6	6.392
21	21 16 19.12	1.9901	13 57 55.3	6.452
22	21 18 18.46	1.9879	13 51 26.4	6.511
23	21 20 17.67	1.9858	S. 13 44 54.0	6.570

SATURDAY 14.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
0	21 22 16.76	1.9837	S. 13 38 18.0	6.628
1	21 24 15.72	1.9816	13 31 38.6	6.686
2	21 26 14.55	1.9794	13 24 55.7	6.743
3	21 28 13.25	1.9773	13 18 9.4	6.800
4	21 30 11.83	1.9753	13 11 19.7	6.856
5	21 32 10.29	1.9732	13 4 26.7	6.911
6	21 34 8.62	1.9712	12 57 30.4	6.966
7	21 36 6.83	1.9691	12 50 30.8	7.020
8	21 38 4.91	1.9670	12 43 28.0	7.074
9	21 40 2.87	1.9650	12 36 21.9	7.128
10	21 42 0.71	1.9630	12 29 12.6	7.181
11	21 43 58.43	1.9610	12 22 0.2	7.233
12	21 45 56.03	1.9590	12 14 44.7	7.284
13	21 47 53.51	1.9570	12 7 26.1	7.335
14	21 49 50.87	1.9551	12 0 4.5	7.385
15	21 51 48.12	1.9532	11 52 39.9	7.435
16	21 53 45.25	1.9513	11 45 12.3	7.485
17	21 55 42.27	1.9494	11 37 41.7	7.534
18	21 57 39.18	1.9476	11 30 8.2	7.582
19	21 59 35.98	1.9457	11 22 31.8	7.630
20	22 1 32.66	1.9438	11 14 52.6	7.677
21	22 3 29.23	1.9420	11 7 10.6	7.723
22	22 5 25.70	1.9402	10 59 25.8	7.769
23	22 7 22.06	1.9384	10 51 38.3	7.814
24	22 9 18.31	1.9367	S. 10 43 48.1	7.859

SUNDAY 15.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
	h m s	s	° ′ ″	″
0	22 9 18.31	1.9367	S. 10 43 48.1	7.859
1	22 11 14.46	1.9349	10 35 55.2	7.903
2	22 13 10.50	1.9332	10 27 59.7	7.947
3	22 15 6.44	1.9315	10 20 1.5	7.991
4	22 17 2.28	1.9298	10 12 0.8	8.033
5	22 18 58.02	1.9282	10 3 57.6	8.074
6	22 20 53.67	1.9266	9 55 51.9	8.116
7	22 22 49.22	1.9250	9 47 43.7	8.157
8	22 24 44.67	1.9234	9 39 33.1	8.197
9	22 26 40.03	1.9219	9 31 20.1	8.237
10	22 28 35.30	1.9204	9 23 4.7	8.276
11	22 30 30.48	1.9189	9 14 47.0	8.314
12	22 32 25.57	1.9174	9 6 27.0	8.352
13	22 34 20.57	1.9160	8 58 4.8	8.389
14	22 36 15.49	1.9146	8 49 40.3	8.426
15	22 38 10.32	1.9132	8 41 13.6	8.462
16	22 40 5.07	1.9118	8 32 44.8	8.498
17	22 41 59.74	1.9106	8 24 13.8	8.534
18	22 43 54.34	1.9093	8 15 40.7	8.568
19	22 45 48.86	1.9080	8 7 5.6	8.602
20	22 47 43.30	1.9067	7 58 28.5	8.636
21	22 49 37.66	1.9054	7 49 49.3	8.669
22	22 51 31.95	1.9043	7 41 8.2	8.701
23	22 53 26.17	1.9032	S. 7 32 25.2	8.732

MONDAY 16.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
0	22 55 20.33	1.9021	S. 7 23 40.4	8.763
1	22 57 14.42	1.9010	7 14 53.7	8.793
2	22 59 8.45	1.8999	7 6 5.2	8.823
3	23 1 2.41	1.8988	6 57 14.9	8.853
4	23 2 56.31	1.8978	6 48 22.8	8.882
5	23 4 50.15	1.8969	6 39 29.0	8.910
6	23 6 43.94	1.8960	6 30 33.6	8.937
7	23 8 37.67	1.8951	6 21 36.5	8.965
8	23 10 31.35	1.8942	6 12 37.8	8.992
9	23 12 24.98	1.8934	6 3 37.5	9.018
10	23 14 18.56	1.8926	5 54 35.7	9.043
11	23 16 12.09	1.8918	5 45 32.4	9.068
12	23 18 5.58	1.8912	5 36 27.6	9.093
13	23 19 59.03	1.8905	5 27 21.3	9.117
14	23 21 52.44	1.8898	5 18 13.6	9.139
15	23 23 45.81	1.8892	5 9 4.6	9.161
16	23 25 39.14	1.8885	4 59 54.3	9.182
17	23 27 32.43	1.8879	4 50 42.7	9.204
18	23 29 25.69	1.8875	4 41 29.8	9.226
19	23 31 18.93	1.8871	4 32 15.6	9.247
20	23 33 12.14	1.8866	4 23 0.2	9.266
21	23 35 5.32	1.8862	4 13 43.7	9.284
22	23 36 58.48	1.8858	4 4 26.1	9.303
23	23 38 51.62	1.8855	3 55 7.4	9.321
24	23 40 44.74	1.8852	S. 3 45 47.6	9.339

GREENWICH MEAN TIME.

THE MOON'S RIGHT ASCENSION AND DECLINATION.

TUESDAY 17.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
	h m s	s	° ′ ″	″
0	23 40 44.74	1.8852	S. 3 45 47.6	9.339
1	23 42 37.85	1.8850	3 36 26.7	9.356
2	23 44 30.94	1.8848	3 27 4.9	9.372
3	23 46 24.02	1.8846	3 17 42.1	9.387
4	23 48 17.09	1.8844	3 8 18.4	9.402
5	23 50 10.15	1.8843	2 58 53.8	9.417
6	23 52 3.21	1.8842	2 49 28.3	9.432
7	23 53 56.26	1.8842	2 40 2.0	9.445
8	23 55 49.32	1.8843	2 30 34.9	9.458
9	23 57 42.38	1.8844	2 21 7.1	9.470
10	23 59 35.45	1.8845	2 11 38.5	9.482
11	0 1 28.52	1.8846	2 2 9.3	9.493
12	0 3 21.60	1.8848	1 52 39.4	9.503
13	0 5 14.69	1.8850	1 43 8.9	9.513
14	0 7 7.80	1.8853	1 33 37.8	9.523
15	0 9 0.93	1.8857	1 24 6.2	9.532
16	0 10 54.08	1.8860	1 14 34.0	9.540
17	0 12 47.25	1.8863	1 5 1.4	9.547
18	0 14 40.44	1.8867	0 55 28.3	9.555
19	0 16 33.66	1.8872	0 45 54.8	9.562
20	0 18 26.91	1.8878	0 36 20.9	9.567
21	0 20 20.20	1.8884	0 26 46.7	9.572
22	0 22 13.52	1.8890	0 17 12.2	9.577
23	0 24 6.88	1.8896	S. 0 7 37.4	9.582

WEDNESDAY 18.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
0	0 26 0.27	1.8903	N. 0 1 57.6	9.585
1	0 27 53.71	1.8911	0 11 32.8	9.588
2	0 29 47.20	1.8918	0 21 8.2	9.591
3	0 31 40.73	1.8927	0 30 43.8	9.593
4	0 33 34.32	1.8936	0 40 19.4	9.594
5	0 35 27.96	1.8944	0 49 55.1	9.595
6	0 37 21.65	1.8953	0 59 30.8	9.595
7	0 39 15.40	1.8963	1 9 6.5	9.595
8	0 41 9.21	1.8974	1 18 42.2	9.594
9	0 43 3.09	1.8986	1 28 17.8	9.592
10	0 44 57.04	1.8997	1 37 53.3	9.590
11	0 46 51.05	1.9008	1 47 28.6	9.587
12	0 48 45.13	1.9020	1 57 3.7	9.583
13	0 50 39.29	1.9033	2 6 38.6	9.580
14	0 52 33.53	1.9047	2 16 13.3	9.576
15	0 54 27.85	1.9060	2 25 47.7	9.570
16	0 56 22.25	1.9073	2 35 21.7	9.564
17	0 58 16.73	1.9088	2 44 55.4	9.558
18	1 0 11.30	1.9103	2 54 28.7	9.551
19	1 2 5.97	1.9118	3 4 1.5	9.543
20	1 4 0.73	1.9134	3 13 33.9	9.536
21	1 5 55.68	1.9150	3 23 5.8	9.527
22	1 7 50.53	1.9167	3 32 37.1	9.517
23	1 9 45.50	1.9185	3 42 7.8	9.507
24	1 11 40.75	1.9203	N. 3 51 37.9	9.496

THURSDAY 19.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
	h m s	s	° ′ ″	″
0	1 11 40.75	1.9203	N. 3 51 37.9	9.496
1	1 13 36.02	1.9221	4 1 7.3	9.485
2	1 15 31.40	1.9240	4 10 36.1	9.474
3	1 17 26.90	1.9259	4 20 4.2	9.462
4	1 19 22.51	1.9278	4 29 31.5	9.448
5	1 21 18.23	1.9297	4 38 57.9	9.433
6	1 23 14.07	1.9318	4 48 23.5	9.419
7	1 25 10.04	1.9339	4 57 48.2	9.404
8	1 27 6.14	1.9360	5 7 12.0	9.389
9	1 29 2.36	1.9382	5 16 34.9	9.373
10	1 30 58.72	1.9405	5 25 56.8	9.356
11	1 32 55.22	1.9427	5 35 17.6	9.338
12	1 34 51.85	1.9450	5 44 37.3	9.319
13	1 36 48.62	1.9474	5 53 55.9	9.301
14	1 38 45.54	1.9498	6 3 13.4	9.282
15	1 40 42.60	1.9522	6 12 29.7	9.261
16	1 42 39.81	1.9548	6 21 44.7	9.240
17	1 44 37.18	1.9574	6 30 58.5	9.219
18	1 46 34.70	1.9600	6 40 11.0	9.197
19	1 48 32.38	1.9627	6 49 22.1	9.173
20	1 50 30.22	1.9653	6 58 31.8	9.150
21	1 52 28.22	1.9681	7 7 40.1	9.126
22	1 54 26.39	1.9708	7 16 46.9	9.101
23	1 56 24.72	1.9736	N. 7 25 52.2	9.076

FRIDAY 20.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
0	1 58 23.22	1.9765	N. 7 34 56.0	9.050
1	2 0 21.90	1.9794	7 43 58.2	9.023
2	2 2 20.75	1.9823	7 52 58.7	8.995
3	2 4 19.78	1.9853	8 1 57.6	8.967
4	2 6 18.99	1.9884	8 10 54.7	8.938
5	2 8 18.39	1.9916	8 19 50.1	8.908
6	2 10 17.98	1.9947	8 28 43.7	8.878
7	2 12 17.76	1.9979	8 37 35.5	8.846
8	2 14 17.73	2.0011	8 46 25.3	8.814
9	2 16 17.89	2.0043	8 55 13.2	8.782
10	2 18 18.25	2.0077	9 3 59.1	8.748
11	2 20 18.81	2.0111	9 12 43.0	8.715
12	2 22 19.58	2.0146	9 21 24.9	8.681
13	2 24 20.56	2.0180	9 30 4.7	8.645
14	2 26 21.74	2.0214	9 38 42.3	8.608
15	2 28 23.13	2.0249	9 47 17.7	8.571
16	2 30 24.73	2.0285	9 55 50.8	8.534
17	2 32 26.55	2.0322	10 4 21.7	8.496
18	2 34 28.59	2.0358	10 12 50.3	8.457
19	2 36 30.85	2.0395	10 21 16.5	8.417
20	2 38 33.33	2.0432	10 29 40.3	8.376
21	2 40 36.04	2.0470	10 38 1.6	8.334
22	2 42 38.97	2.0508	10 46 20.4	8.292
23	2 44 42.14	2.0547	10 54 36.6	8.248
24	2 46 45.54	2.0587	N. 11 2 50.2	8.204

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Name and Direction of Object.		Noon.	P. L. of Diff.	IIIh.	P. L. of Diff.	VIh.	P. L. of Diff.	IXh.	P. L. of Diff.
1	Sun	W.	18° 4′ 10″	2394	19° 49′ 35″	2391	21° 35′ 4″	2391	23° 20′ 33″	2383
	Mars	E.	50 4 2	2188	48 15 16	2194	46 26 39	2200	44 38 11	2207
	Spica	E.	55 5 54	2032	53 13 9	2037	51 20 33	2044	49 28 8	2052
	Antares	E.	100 55 13	2064	99 3 18	2068	97 11 29	2072	95 19 47	2077
2	Sun	W.	32 6 33	2353	33 51 16	2362	35 35 46	2371	37 20 2	2381
	Mars	E.	35 39 1	2257	33 51 58	2270	32 5 14	2284	30 18 51	2299
	Spica	E.	40 9 34	2107	38 18 45	2121	36 28 18	2136	34 38 14	2153
	Antares	E.	86 3 43	2116	84 13 8	2126	82 22 48	2136	80 32 44	2148
3	Sun	W.	45 57 21	2443	47 39 54	2457	49 22 8	2471	51 4 2	2486
	Antares	E.	71 27 5	2214	69 38 59	2230	67 51 16	2245	66 3 56	2262
	α Aquilæ	E.	117 33 30	2744	115 57 49	2739	114 22 1	2736	112 46 9	2735
4	Sun	W.	59 28 10	2565	61 7 53	2582	62 47 13	2599	64 26 10	2616
	Antares	E.	57 13 33	2350	55 28 49	2371	53 44 33	2392	52 0 47	2413
	α Aquilæ	E.	104 47 20	2756	103 11 55	2766	101 36 42	2775	100 1 41	2785
5	Sun	W.	72 35 4	2702	74 11 41	2719	75 47 55	2738	77 23 45	2755
	Jupiter	W.	22 25 32	2447	24 8 0	2463	25 50 5	2479	27 31 48	2495
	Antares	E.	43 29 46	2530	41 49 14	2556	40 9 19	2584	38 30 2	2613
	α Aquilæ	E.	92 10 32	2853	90 37 13	2869	89 4 15	2887	87 31 39	2904
6	Sun	W.	85 17 12	2842	86 50 46	2858	88 23 59	2875	89 56 50	2892
	Jupiter	W.	35 54 42	2576	37 34 10	2592	39 13 16	2608	40 52 0	2624
	Mars	W.	19 32 43	2798	21 7 14	2804	22 41 37	2811	24 15 50	2821
	Spica	W.	18 9 56	2736	19 45 50	2718	21 22 4	2707	22 58 34	2702
	α Aquilæ	E.	79 54 30	3002	78 24 20	3023	76 54 36	3046	75 25 20	3069
7	Sun	W.	97 35 49	2972	99 6 37	2988	100 37 5	3002	102 7 15	3018
	Jupiter	W.	49 0 28	2699	50 37 9	2713	52 13 31	2728	53 49 34	2741
	Mars	W.	32 3 29	2879	33 36 15	2892	35 8 44	2905	36 40 57	2917
	Spica	W.	31 1 17	2719	32 37 31	2727	34 13 35	2735	35 49 28	2744
	α Aquilæ	E.	68 6 24	3197	66 40 11	3225	65 14 31	3254	63 49 26	3284
	Fomalhaut	E.	100 56 45	2964	99 25 47	2975	97 55 3	2987	96 24 34	2998
8	Sun	W.	109 33 31	3088	111 1 55	3101	112 30 3	3114	113 57 55	3127
	Jupiter	W.	61 45 18	2808	63 19 35	2821	64 53 36	2833	66 27 21	2845
	Mars	W.	44 18 1	2980	45 48 39	2992	47 19 2	3004	48 49 10	3015
	Spica	W.	43 45 53	2792	45 20 32	2802	46 54 57	2812	48 29 9	2821
	α Aquilæ	E.	56 53 20	3458	55 32 9	3497	54 11 42	3540	52 52 2	3586
	Fomalhaut	E.	88 55 53	3060	87 26 55	3074	85 58 14	3087	84 29 49	3101
9	Sun	W.	121 13 31	3188	122 39 57	3198	124 6 9	3208	125 32 9	3219
	Jupiter	W.	74 12 23	2901	75 44 41	2911	77 16 46	2920	78 48 39	2931
	Spica	W.	56 17 4	2869	57 50 2	2878	59 22 49	2887	60 55 25	2895
	Mars	W.	56 16 18	3071	57 45 3	3081	59 13 36	3091	60 41 56	3101
	α Aquilæ	E.	46 26 54	3858	45 12 52	3925	43 59 58	3999	42 48 17	4077
	Fomalhaut	E.	77 11 31	3171	75 45 7	3185	74 18 40	3200	72 52 31	3216
10	Jupiter	W.	86 25 3	2973	87 55 47	2983	89 26 21	2991	90 56 45	2999
	Spica	W.	68 35 42	2936	70 7 15	2943	71 38 39	2950	73 9 54	2958

GREENWICH MEAN TIME.

LUNAR

AT GREENWICH MEAN NOON.

Day of the Week.	Day of the Month.	THE SUN'S Apparent Right Ascension.	Diff. for 1 Hour.	Apparent Declination.	Diff. for 1 Hour.	Equation of Time, to be Added to Mean Time.	Diff. for 1 Hour.	Sidereal Time, or Right Ascension of Mean Sun.
		h m s	s	° ′ ″	″	m s	s	h m s
Wed.	1	10 42 9.46	9.075	N. 8 13 26.7	−54.53	0 7.93	0.781	10 42 17.39
Thur.	2	10 45 47.11	9.062	7 51 34.0	54.86	0 26.84	0.794	10 46 13.95
Frid.	3	10 49 24.46	9.051	7 29 33.6	55.17	0 46.04	0.805	10 50 10.50
Sat.	4	10 53 1.55	9.040	7 7 26.0	−55.46	1 5.50	0.816	10 54 7.05
SUN.	5	10 56 38.38	9.029	6 45 11.6	55.74	1 25.22	0.827	10 58 3.60
Mon.	6	11 0 14.96	9.019	6 22 50.6	56.01	1 45.20	0.837	11 2 0.16
Tues.	7	11 3 51.31	9.010	6 0 23.3	−56.26	2 5.40	0.846	11 5 56.71
Wed.	8	11 7 27.47	9.002	5 37 50.1	56.50	2 25.79	0.854	11 9 53.26
Thur.	9	11 11 3.44	8.995	5 15 11.3	56.73	2 46.37	0.861	11 13 49.81
Frid.	10	11 14 39.24	8.989	4 52 27.2	−56.94	3 7.12	0.867	11 17 46.37
Sat.	11	11 18 14.91	8.983	4 29 38.2	57.14	3 28.01	0.873	11 21 42.92
SUN.	12	11 21 50.46	8.978	4 6 44.5	57.33	3 49.01	0.878	11 25 39.47
Mon.	13	11 25 25.91	8.975	3 43 46.5	−57.50	4 10.11	0.881	11 29 36.02
Tues.	14	11 29 1.28	8.973	3 20 44.4	57.66	4 31.29	0.883	11 33 32.57
Wed.	15	11 32 36.61	8.972	2 57 38.6	57.81	4 52.51	0.884	11 37 29.12
Thur.	16	11 36 11.92	8.972	2 34 29.5	−57.94	5 13.76	0.884	11 41 25.68
Frid.	17	11 39 47.23	8.972	2 11 17.3	58.06	5 35.00	0.884	11 45 22.23
Sat.	18	11 43 22.56	8.973	1 48 2.4	58.17	5 56.22	0.883	11 49 18.78
SUN.	19	11 46 57.93	8.975	1 24 45.0	−58.27	6 17.40	0.881	11 53 15.33
Mon.	20	11 50 33.36	8.978	1 1 25.5	58.35	6 38.52	0.878	11 57 11.88
Tues.	21	11 54 8.88	8.982	0 38 4.3	58.42	6 59.55	0.874	12 1 8.43
Wed.	22	11 57 44.50	8.987	N. 0 14 41.6	−58.47	7 20.49	0.869	12 5 4.99
Thur.	23	12 1 20.25	8.993	S. 0 8 42.2	58.51	7 41.29	0.863	12 9 1.54
Frid.	24	12 4 56.15	8.999	0 32 6.8	58.53	8 1.94	0.857	12 12 58.09
Sat.	25	12 8 32.21	9.006	0 55 31.8	−58.54	8 22.43	0.850	12 16 54.64
SUN.	26	12 12 8.45	9.014	1 18 56.8	58.53	8 42.75	0.842	12 20 51.20
Mon.	27	12 15 44.89	9.023	1 42 21.5	58.51	9 2.86	0.833	12 24 47.75
Tues.	28	12 19 21.54	9.032	2 5 45.5	−58.47	9 22.76	0.824	12 28 44.30
Wed.	29	12 22 58.43	9.042	2 29 8.3	58.42	9 42.42	0.814	12 32 40.85
Thur.	30	12 26 35.56	9.053	2 52 29.7	58.35	10 1.84	0.803	12 36 37.40
	31							
Frid.		12 30 12.95	9.064	S. 3 15 49.3	−58.27	10 21.00	0.792	12 40 33.95

NOTE.—The semidiameter for mean noon may be assumed the same as that for apparent noon. The sign − prefixed to the hourly change of declination indicates that north declinations are decreasing; south declinations, increasing.

Diff. for 1 Hour, + 9s.8565. (Table III.)

GREENWICH MEAN TIME.

THE MOON'S RIGHT ASCENSION AND DECLINATION.

WEDNESDAY 1.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
	h m s	s	° ′ ″	″
0	13 20 30.60	2.3033	S. 4 34 54.1	11.269
1	13 22 48.75	2.3017	4 46 9.0	11.227
2	13 25 6.81	2.3002	4 57 21.4	11.184
3	13 27 24.77	2.2986	5 8 31.1	11.139
4	13 29 42.64	2.2970	5 19 38.1	11.094
5	13 32 0.41	2.2954	5 30 42.4	11.048
6	13 34 18.09	2.2939	5 41 43.9	11.001
7	13 36 35.68	2.2924	5 52 42.5	10.952
8	13 38 53.18	2.2910	6 3 38.1	10.902
9	13 41 10.60	2.2896	6 14 30.7	10.851
10	13 43 27.93	2.2882	6 25 20.2	10.799
11	13 45 45.18	2.2867	6 36 6.6	10.747
12	13 48 2.34	2.2853	6 46 49.8	10.692
13	13 50 19.42	2.2840	6 57 29.7	10.637
14	13 52 36.42	2.2827	7 8 6.3	10.582
15	13 54 53.35	2.2815	7 18 39.5	10.525
16	13 57 10.20	2.2802	7 29 9.3	10.467
17	13 59 26.97	2.2788	7 39 35.6	10.409
18	14 1 43.66	2.2776	7 49 58.4	10.350
19	14 4 0.28	2.2764	8 0 17.6	10.289
20	14 6 16.83	2.2752	8 10 33.1	10.227
21	14 8 33.31	2.2741	8 20 44.9	10.165
22	14 10 49.72	2.2729	8 30 53.0	10.102
23	14 13 6.06	2.2718	S. 8 40 57.2	10.038

THURSDAY 2.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
0	14 15 22.34	2.2707	S. 8 50 57.6	9.974
1	14 17 38.55	2.2696	9 0 54.1	9.908
2	14 19 54.69	2.2685	9 10 46.6	9.842
3	14 22 10.77	2.2674	9 20 35.1	9.775
4	14 24 26.78	2.2663	9 30 19.6	9.707
5	14 26 42.73	2.2653	9 39 59.9	9.638
6	14 28 58.62	2.2643	9 49 36.1	9.568
7	14 31 14.45	2.2633	9 59 8.1	9.498
8	14 33 30.22	2.2623	10 8 35.9	9.427
9	14 35 45.93	2.2614	10 17 59.4	9.356
10	14 38 1.59	2.2605	10 27 18.6	9.283
11	14 40 17.19	2.2595	10 36 33.4	9.210
12	14 42 32.73	2.2586	10 45 43.8	9.136
13	14 44 48.22	2.2577	10 54 49.7	9.061
14	14 47 3.65	2.2568	11 3 51.1	8.987
15	14 49 19.03	2.2559	11 12 48.1	8.911
16	14 51 34.36	2.2550	11 21 40.5	8.834
17	14 53 49.63	2.2541	11 30 28.2	8.757
18	14 56 4.85	2.2532	11 39 11.3	8.679
19	14 58 20.02	2.2524	11 47 49.7	8.601
20	15 0 35.14	2.2516	11 56 23.4	8.522
21	15 2 50.21	2.2507	12 4 52.4	8.443
22	15 5 5.23	2.2499	12 13 16.6	8.363
23	15 7 20.20	2.2492	12 21 35.9	8.282
24	15 9 35.13	2.2484	S. 12 29 50.4	8.201

FRIDAY 3.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
	h m s	s	° ′ ″	″
0	15 9 35.13	2.2484	S. 12 29 50.4	8.201
1	15 11 50.01	2.2476	12 38 0.0	8.119
2	15 14 4.84	2.2468	12 46 4.7	8.037
3	15 16 19.62	2.2460	12 54 4.4	7.954
4	15 18 34.36	2.2452	13 1 59.2	7.871
5	15 20 49.05	2.2444	13 9 48.9	7.787
6	15 23 3.69	2.2437	13 17 33.6	7.702
7	15 25 18.29	2.2429	13 25 13.2	7.617
8	15 27 32.84	2.2422	13 32 47.7	7.532
9	15 29 47.35	2.2415	13 40 17.1	7.447
10	15 32 1.82	2.2407	13 47 41.3	7.361
11	15 34 16.24	2.2399	13 55 0.4	7.275
12	15 36 30.61	2.2392	14 2 14.3	7.188
13	15 38 44.94	2.2384	14 9 22.9	7.100
14	15 40 59.22	2.2377	14 16 26.3	7.012
15	15 43 13.46	2.2370	14 23 24.4	6.924
16	15 45 27.66	2.2362	14 30 17.2	6.836
17	15 47 41.81	2.2354	14 37 4.7	6.747
18	15 49 55.91	2.2347	14 43 46.9	6.658
19	15 52 9.97	2.2339	14 50 23.7	6.568
20	15 54 23.98	2.2332	14 56 55.1	6.478
21	15 56 37.95	2.2325	15 3 21.1	6.388
22	15 58 51.88	2.2317	15 9 41.7	6.297
23	16 1 5.76	2.2309	S. 15 15 56.8	6.207

SATURDAY 4.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
0	16 3 19.59	2.2302	S. 15 22 6.5	6.116
1	16 5 33.38	2.2294	15 28 10.7	6.024
2	16 7 47.12	2.2286	15 34 9.4	5.933
3	16 10 0.81	2.2278	15 40 2.7	5.841
4	16 12 14.46	2.2271	15 45 50.4	5.748
5	16 14 28.06	2.2263	15 51 32.5	5.656
6	16 16 41.61	2.2254	15 57 9.1	5.563
7	16 18 55.11	2.2246	16 2 40.1	5.470
8	16 21 8.56	2.2238	16 8 5.5	5.378
9	16 23 21.96	2.2230	16 13 25.4	5.285
10	16 25 35.32	2.2222	16 18 39.7	5.191
11	16 27 48.63	2.2214	16 23 48.3	5.097
12	16 30 1.89	2.2206	16 28 51.3	5.003
13	16 32 15.10	2.2197	16 33 48.7	4.909
14	16 34 28.25	2.2188	16 38 40.4	4.814
15	16 36 41.35	2.2179	16 43 26.4	4.720
16	16 38 54.40	2.2170	16 48 6.8	4.626
17	16 41 7.39	2.2161	16 52 41.5	4.531
18	16 43 20.33	2.2152	16 57 10.5	4.436
19	16 45 33.21	2.2142	17 1 33.8	4.341
20	16 47 46.04	2.2133	17 5 51.4	4.247
21	16 49 58.81	2.2123	17 10 3.4	4.152
22	16 52 11.52	2.2114	17 14 9.6	4.056
23	16 54 24.18	2.2105	17 18 10.1	3.960
24	16 56 36.78	2.2095	S. 17 22 4.8	3.864

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Name and Direction of Object.		Noon.	P. L. of Diff.	IIIh.	P. L. of Diff.	VIh.	P. L. of Diff.	IXh.	P. L. of Diff.
9	Spica	W.	101° 40′ 8″	3071	103° 8′ 53″	3074	104° 37′ 34″	3077	106° 6′ 12″	3080
	Mars	W.	81 54 47	3319	83 18 36	3324	84 42 20	3326	86 6 1	3330
	Antares	W.	56 6 56	3140	57 34 17	3140	59 1 38	3140	60 28 59	3141
	Fomalhaut	E.	36 47 7	4103	35 37 8	4185	34 28 28	4279	33 21 16	4384
	α Pegasi	E.	49 44 0	3582	48 25 6	3610	47 6 43	3641	45 48 53	3674
	α Arietis	E.	91 41 55	3188	90 15 31	3191	88 49 11	3193	87 22 54	3197
10	Mars	W.	93 3 39	3341	94 27 3	3342	95 50 26	3344	97 13 47	3345
	Antares	W.	67 45 38	3141	69 12 58	3140	70 40 19	3140	72 7 40	3140
	α Aquilæ	W.	31 4 43	5730	31 52 50	5507	32 43 29	5311	33 36 28	5137
	α Arietis	E.	80 12 25	3211	78 46 29	3214	77 20 37	3217	75 54 48	3219
	Aldebaran	E.	112 36 7	3066	111 7 16	3068	109 38 27	3069	108 9 39	3069
11	Antares	W.	79 24 36	3135	80 52 3	3134	82 19 31	3133	83 47 1	3132
	α Aquilæ	W.	38 30 39	4512	39 34 20	4494	40 39 20	4348	41 45 34	4269
	α Arietis	E.	68 46 27	3233	67 20 57	3236	65 55 30	3239	64 30 7	3242
	Aldebaran	E.	100 45 45	3069	99 16 57	3069	97 48 9	3068	96 19 20	3066
12	Antares	W.	91 4 57	3123	92 32 39	3121	94 0 23	3119	95 28 10	3117
	α Aquilæ	W.	47 32 6	3985	48 44 0	3942	49 56 37	3902	51 9 55	3865
	α Arietis	E.	57 24 12	3262	55 59 16	3267	54 34 26	3272	53 9 42	3279
	Aldebaran	E.	88 54 50	3059	87 25 50	3056	85 56 47	3054	84 27 41	3052
13	α Aquilæ	W.	57 25 6	3714	58 41 38	3690	59 58 36	3666	61 15 59	3645
	α Arietis	E.	46 8 12	3322	44 44 26	3334	43 20 54	3348	41 57 38	3363
	Aldebaran	E.	77 1 25	3038	75 31 59	3034	74 2 28	3030	72 32 53	3027
14	α Aquilæ	W.	67 48 17	3555	69 7 41	3538	70 27 23	3524	71 47 21	3510
	Fomalhaut	W.	35 23 4	4076	36 33 29	3998	37 45 11	3927	38 58 3	3864
	α Pegasi	W.	24 18 27	5716	25 6 43	5409	25 58 31	5149	26 53 31	4925
	Aldebaran	E.	65 3 47	3006	63 33 42	3002	62 3 32	2997	60 33 16	2993
	Saturn	E.	107 13 15	3046	105 43 59	3041	104 14 37	3036	102 45 9	3031
15	α Aquilæ	W.	78 30 45	3450	79 52 5	3440	81 13 36	3431	82 35 18	3421
	Fomalhaut	W.	45 16 58	3619	46 35 12	3581	47 54 7	3546	49 13 40	3515
	α Pegasi	W.	32 7 4	4176	33 15 53	4075	34 26 19	3984	35 38 14	3905
	Aldebaran	E.	53 0 21	2966	51 29 26	2960	49 58 23	2954	48 27 13	2949
	Saturn	E.	95 16 12	3004	93 46 4	2998	92 15 49	2992	90 45 26	2985
	Pollux	E.	96 53 38	3039	95 24 14	3033	93 54 42	3027	92 25 3	3021
16	Fomalhaut	W.	55 59 44	3379	57 22 25	3356	58 45 32	3334	60 9 4	3313
	α Pegasi	W.	41 55 47	3605	43 14 16	3559	44 33 35	3517	45 53 40	3479
	Aldebaran	E.	40 49 25	2916	39 17 26	2909	37 45 18	2901	36 13 0	2893
	Saturn	E.	83 11 31	2952	81 40 18	2946	80 8 57	2938	78 37 26	2931
	Pollux	E.	84 54 47	2989	83 24 20	2981	81 53 44	2975	80 23 0	2968
17	Fomalhaut	W.	67 12 30	3221	68 38 14	3204	70 4 18	3188	71 30 41	3173
	α Pegasi	W.	52 44 4	3319	54 7 54	3292	55 32 15	3266	56 57 6	3242
	Saturn	E.	70 57 23	2890	69 24 51	2880	67 52 7	2872	66 19 12	2863
	Pollux	E.	72 47 7	2933	71 15 30	2925	69 43 43	2918	68 11 47	2910
	Regulus	E.	108 36 14	2854	107 2 56	2845	105 29 26	2836	103 55 45	2827
	Sun	E.	134 41 13	3209	133 15 14	3198	131 49 3	3189	130 22 41	3179

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Month.	Name and Direction of Object.		Midnight.	P. L. of Diff.	XV^h.	P. L. of Diff.	XVIII^h.	P. L. of Diff.	XXI^h.	P. L. of Diff.
9	Spica	W.	107° 34′ 46″	3083	109° 3′ 16″	3067	110° 31′ 42″	3009	112° 0′ 5″	3081
	Mars	W.	87 29 38	3339	88 53 12	3334	90 16 44	3337	91 40 13	3339
	Antares	W.	61 56 19	3141	63 23 39	3141	64 50 59	3142	66 18 18	3141
	Fomalhaut	E.	32 15 40	4509	31 11 50	4636	30 9 56	4787	29 10 9	4961
	α Pegasi	E.	44 31 38	3710	43 15 2	3740	41 59 7	3792	40 43 57	3839
	α Arietis	E.	85 56 41	3900	84 30 32	3903	83 4 26	3906	81 38 24	3909
0	Mars	W.	98 37 7	3345	100 0 27	3345	101 23 46	3346	102 47 4	3346
	Antares	W.	73 35 1	3139	75 2 23	3138	76 29 46	3138	77 57 10	3136
	α Aquilæ	W.	34 31 37	4964	35 28 45	4845	36 27 44	4722	37 28 25	4612
	α Arietis	E.	74 29 1	3921	73 3 17	3925	71 37 37	3927	70 12 0	3931
	Aldebaran	E.	106 40 51	3069	105 12 4	3070	103 43 18	3070	102 14 32	3066
1	Antares	W.	85 14 32	3130	86 42 5	3199	88 9 40	3197	89 37 17	3194
	α Aquilæ	W.	42 52 55	4202	44 1 19	4140	45 10 42	4084	46 20 59	4033
	α Arietis	E.	63 4 47	3945	61 39 31	3949	60 14 20	3953	58 49 13	3958
	Aldebaran	E.	94 50 29	3065	93 21 37	3064	91 52 43	3062	90 23 47	3061
2	Antares	W.	96 55 59	3114	98 23 51	3113	99 51 45	3110	101 19 42	3108
	α Aquilæ	W.	52 23 50	3830	53 38 21	3797	54 53 26	3768	56 9 2	3741
	α Arietis	E.	51 45 6	3286	50 20 38	3294	48 56 19	3302	47 32 10	3312
	Aldebaran	E.	82 58 33	3049	81 29 21	3047	80 0 6	3043	78 30 47	3041
3	α Aquilæ	W.	62 33 45	3604	63 51 53	3606	65 10 22	3587	66 29 10	3570
	α Arietis	E.	40 34 39	3380	39 12 0	3400	37 49 43	3423	36 27 52	3448
	Aldebaran	E.	71 3 14	3023	69 33 30	3019	68 3 41	3015	66 33 47	3010
4	α Aquilæ	W.	73 7 34	3497	74 28 1	3485	75 48 42	3473	77 9 37	3461
	Fomalhaut	W.	40 11 59	3806	41 26 55	3753	42 42 46	3705	43 59 28	3660
	α Pegasi	W.	27 51 26	4739	28 51 59	4564	29 54 55	4417	31 0 1	4289
	Aldebaran	E.	59 2 54	2966	57 32 26	2969	56 1 51	2977	54 31 9	2979
	Saturn	E.	101 15 35	3026	99 45 54	3021	98 16 7	3015	96 46 13	3009
5	α Aquilæ	W.	83 57 11	3419	85 19 14	3403	86 41 27	3386	88 3 48	3368
	Fomalhaut	W.	50 33 48	3484	51 54 30	3454	53 15 45	3426	54 37 30	3402
	α Pegasi	W.	36 51 29	3833	38 5 57	3768	39 21 33	3709	40 38 11	3654
	Aldebaran	E.	46 55 56	2949	45 24 31	2936	43 52 58	2929	42 21 16	2922
	Saturn	E.	89 14 55	2980	87 44 16	2973	86 13 30	2966	84 42 35	2959
	Pollux	E.	90 55 16	3014	89 25 21	3008	87 55 18	3001	86 25 7	2994
6	Fomalhaut	W.	61 33 1	3893	62 57 21	3874	64 22 3	3856	65 47 6	3838
	α Pegasi	W.	47 14 28	3442	48 35 57	3408	49 58 4	3377	51 20 47	3347
	Aldebaran	E.	34 40 32	2886	33 7 55	2878	31 35 8	2869	30 2 10	2861
	Saturn	E.	77 5 46	2923	75 33 56	2914	74 1 55	2906	72 29 44	2898
	Pollux	E.	78 52 7	2961	77 21 5	2954	75 49 54	2947	74 18 35	2940
7	Fomalhaut	W.	72 57 22	3158	74 24 21	3143	75 51 39	3129	77 19 14	3114
	α Pegasi	W.	58 22 25	3219	59 48 12	3197	61 14 25	3175	62 41 4	3155
	Saturn	E.	64 46 6	2854	63 12 48	2844	61 39 17	2835	60 5 34	2825
	Pollux	E.	66 39 41	2903	65 7 26	2896	63 35 2	2888	62 2 28	2881
	Regulus	E.	102 21 52	2818	100 47 47	2808	99 13 29	2798	97 38 58	2788
	Sun	E.	128 56 7	3169	127 29 21	3158	126 2 22	3148	124 35 11	3137

GREENWICH MEAN TIME.

THE MOON'S RIGHT ASCENSION AND DECLINATION.

SATURDAY 9.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
	h m s	s	° ′ ″	″
0	22 31 10.29	1.9189	S. 9 14 13.9	8.376
1	22 33 5.39	1.9178	9 5 50.1	8.416
2	22 35 0.43	1.9167	8 57 24.0	8.454
3	22 36 55.40	1.9156	8 48 55.6	8.493
4	22 38 50.30	1.9145	8 40 24.9	8.531
5	22 40 45.14	1.9135	8 31 51.9	8.568
6	22 42 39.92	1.9124	8 23 16.7	8.605
7	22 44 34.63	1.9113	8 14 39.3	8.642
8	22 46 29.28	1.9104	8 5 59.7	8.678
9	22 48 23.88	1.9096	7 57 18.0	8.713
10	22 50 18.43	1.9087	7 48 34.2	8.748
11	22 52 12.93	1.9079	7 39 48.3	8.783
12	22 54 7.38	1.9071	7 31 0.3	8.817
13	22 56 1.78	1.9062	7 22 10.3	8.849
14	22 57 56.13	1.9054	7 13 18.4	8.881
15	22 59 50.43	1.9047	7 4 24.6	8.912
16	23 1 44.69	1.9041	6 55 28.9	8.944
17	23 3 38.92	1.9035	6 46 31.3	8.976
18	23 5 33.11	1.9028	6 37 31.8	9.007
19	23 7 27.26	1.9022	6 28 30.5	9.036
20	23 9 21.38	1.9017	6 19 27.5	9.065
21	23 11 15.46	1.9012	6 10 22.7	9.094
22	23 13 9.52	1.9007	6 1 16.2	9.122
23	23 15 3.55	1.9002	S. 5 52 8.1	9.149

SUNDAY 10.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
0	23 16 57.55	1.8998	S. 5 42 58.3	9.176
1	23 18 51.53	1.8995	5 33 46.9	9.202
2	23 20 45.49	1.8992	5 24 34.0	9.228
3	23 22 39.43	1.8988	5 15 19.5	9.254
4	23 24 33.35	1.8985	5 6 3.5	9.278
5	23 26 27.25	1.8983	4 56 46.1	9.302
6	23 28 21.14	1.8981	4 47 27.2	9.326
7	23 30 15.02	1.8979	4 38 6.9	9.349
8	23 32 8.89	1.8978	4 28 45.3	9.371
9	23 34 2.76	1.8978	4 19 22.4	9.393
10	23 35 56.63	1.8977	4 9 58.1	9.415
11	23 37 50.49	1.8977	4 0 32.6	9.435
12	23 39 44.35	1.8977	3 51 5.9	9.455
13	23 41 38.21	1.8978	3 41 38.0	9.475
14	23 43 32.08	1.8979	3 32 8.9	9.494
15	23 45 25.96	1.8980	3 22 38.7	9.512
16	23 47 19.84	1.8982	3 13 7.4	9.530
17	23 49 13.74	1.8984	3 3 35.1	9.547
18	23 51 7.65	1.8987	2 54 1.8	9.563
19	23 53 1.58	1.8969	2 44 27.5	9.579
20	23 54 55.52	1.8992	2 34 52.3	9.595
21	23 56 49.48	1.8996	2 25 16.1	9.611
22	23 58 43.47	1.9000	2 15 39.0	9.625
23	0 0 37.48	1.9004	2 6 1.1	9.638
24	0 2 31.52	1.9009	S. 1 56 22.5	9.650

MONDAY 11.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
	h m s	s	° ′ ″	″
0	0 2 31.52	1.9009	S. 1 56 22.5	9.650
1	0 4 25.59	1.9014	1 46 43.1	9.663
2	0 6 19.69	1.9019	1 37 3.0	9.675
3	0 8 13.82	1.9025	1 27 22.1	9.686
4	0 10 7.99	1.9031	1 17 40.6	9.696
5	0 12 2.19	1.9037	1 7 58.6	9.705
6	0 13 56.43	1.9044	0 58 16.0	9.715
7	0 15 50.72	1.9051	0 48 32.8	9.723
8	0 17 45.05	1.9059	0 38 49.2	9.731
9	0 19 39.43	1.9067	0 29 5.1	9.738
10	0 21 33.86	1.9076	0 19 20.6	9.745
11	0 23 28.34	1.9084	S. 0 9 35.7	9.752
12	0 25 22.87	1.9093	N. 0 0 9.6	9.757
13	0 27 17.46	1.9102	0 9 55.2	9.762
14	0 29 12.10	1.9112	0 19 41.0	9.765
15	0 31 6.81	1.9123	0 29 27.0	9.768
16	0 33 1.58	1.9134	0 39 13.2	9.771
17	0 34 56.42	1.9145	0 48 59.6	9.774
18	0 36 51.32	1.9156	0 58 46.1	9.775
19	0 38 46.29	1.9167	1 8 32.6	9.776
20	0 40 41.33	1.9179	1 18 19.2	9.777
21	0 42 36.44	1.9192	1 28 5.8	9.777
22	0 44 31.63	1.9205	1 37 52.4	9.775
23	0 46 26.90	1.9218	N. 1 47 38.8	9.772

TUESDAY 12.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
0	0 48 22.25	1.9232	N. 1 57 25.1	9.770
1	0 50 17.68	1.9246	2 7 11.2	9.767
2	0 52 13.20	1.9260	2 16 57.1	9.763
3	0 54 8.80	1.9274	2 26 42.8	9.759
4	0 56 4.49	1.9289	2 36 28.2	9.753
5	0 58 0.27	1.9305	2 46 13.2	9.747
6	0 59 56.15	1.9321	2 55 57.9	9.741
7	1 1 52.13	1.9337	3 5 42.1	9.734
8	1 3 48.20	1.9353	3 15 25.9	9.726
9	1 5 44.37	1.9370	3 25 9.2	9.717
10	1 7 40.64	1.9387	3 34 52.0	9.706
11	1 9 37.02	1.9405	3 44 34.2	9.698
12	1 11 33.50	1.9423	3 54 15.7	9.687
13	1 13 30.09	1.9441	4 3 56.6	9.676
14	1 15 26.79	1.9460	4 13 36.8	9.663
15	1 17 23.61	1.9479	4 23 16.2	9.650
16	1 19 20.54	1.9498	4 32 54.8	9.637
17	1 21 17.59	1.9517	4 42 32.6	9.622
18	1 23 14.75	1.9537	4 52 9.5	9.607
19	1 25 12.03	1.9558	5 1 45.5	9.592
20	1 27 9.44	1.9579	5 11 20.5	9.575
21	1 29 6.98	1.9600	5 20 54.5	9.558
22	1 31 4.64	1.9621	5 30 27.5	9.540
23	1 33 2.43	1.9643	5 39 59.3	9.521
24	1 35 0.36	1.9666	N. 5 49 30.0	9.502

GREENWICH MEAN TIME.

THE MOON'S RIGHT ASCENSION AND DECLINATION.

THURSDAY 21.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
	h m s	s	° ′ ″	″
0	8 45 28.49	2.4018	N. 15 39 56.9	6.529
1	8 47 52.58	2.4011	15 33 22.1	6.632
2	8 50 16.62	2.4003	15 26 41.1	6.734
3	8 52 40.62	2.3996	15 19 54.0	6.836
4	8 55 4.57	2.3988	15 13 0.8	6.937
5	8 57 28.48	2.3981	15 6 1.6	7.038
6	8 59 52.34	2.3972	14 58 56.3	7.138
7	9 2 16.15	2.3963	14 51 45.0	7.236
8	9 4 39.90	2.3954	14 44 27.9	7.334
9	9 7 3.60	2.3946	14 37 4.9	7.432
10	9 9 27.25	2.3937	14 29 36.0	7.530
11	9 11 50.84	2.3928	14 22 1.3	7.626
12	9 14 14.38	2.3918	14 14 20.9	7.721
13	9 16 37.86	2.3908	14 6 34.8	7.816
14	9 19 1.27	2.3898	13 58 43.0	7.910
15	9 21 24.63	2.3888	13 50 45.6	8.003
16	9 23 47.93	2.3877	13 42 42.6	8.096
17	9 26 11.16	2.3867	13 34 34.1	8.187
18	9 28 34.33	2.3857	13 26 20.2	8.277
19	9 30 57.44	2.3846	13 18 0.8	8.367
20	9 33 20.48	2.3836	13 9 36.1	8.456
21	9 35 43.46	2.3824	13 1 6.1	8.544
22	9 38 6.37	2.3813	12 52 30.8	8.632
23	9 40 29.22	2.3802	N. 12 43 50.3	8.718

FRIDAY 22.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
0	9 42 52.00	2.3791	N. 12 35 4.7	8.803
1	9 45 14.71	2.3780	12 26 14.0	8.888
2	9 47 37.36	2.3769	12 17 18.2	8.972
3	9 49 59.94	2.3757	12 8 17.4	9.054
4	9 52 22.45	2.3746	11 59 11.7	9.135
5	9 54 44.89	2.3735	11 50 1.2	9.214
6	9 57 7.27	2.3724	11 40 46.0	9.293
7	9 59 29.58	2.3712	11 31 26.0	9.373
8	10 1 51.81	2.3700	11 22 1.2	9.451
9	10 4 13.98	2.3689	11 12 31.8	9.528
10	10 6 36.08	2.3677	11 2 57.8	9.604
11	10 8 58.11	2.3666	10 53 19.3	9.678
12	10 11 20.07	2.3654	10 43 36.4	9.752
13	10 13 41.96	2.3643	10 33 49.1	9.824
14	10 16 3.78	2.3632	10 23 57.5	9.895
15	10 18 25.54	2.3621	10 14 1.7	9.965
16	10 20 47.23	2.3610	10 4 1.7	10.035
17	10 23 8.85	2.3598	9 53 57.5	10.103
18	10 25 30.41	2.3587	9 43 49.3	10.169
19	10 27 51.90	2.3576	9 33 37.2	10.235
20	10 30 13.32	2.3565	9 23 21.1	10.301
21	10 32 34.68	2.3554	9 13 1.1	10.365
22	10 34 55.97	2.3543	9 2 37.3	10.427
23	10 37 17.20	2.3532	8 52 9.9	10.487
24	10 39 38.36	2.3522	N. 8 41 38.9	10.547

SATURDAY 23.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
	h m s	s	° ′ ″	″
0	10 39 38.36	2.3522	N. 8 41 38.9	10.547
1	10 41 59.46	2.3512	8 31 4.3	10.607
2	10 44 20.50	2.3501	8 20 26.1	10.665
3	10 46 41.47	2.3491	8 9 44.5	10.721
4	10 49 2.39	2.3481	7 58 59.6	10.776
5	10 51 23.25	2.3471	7 48 11.4	10.830
6	10 53 44.04	2.3460	7 37 20.0	10.883
7	10 56 4.77	2.3451	7 26 25.5	10.935
8	10 58 25.45	2.3442	7 15 27.8	10.985
9	11 0 46.07	2.3432	7 4 27.2	11.036
10	11 3 6.63	2.3423	6 53 23.6	11.083
11	11 5 27.14	2.3414	6 42 17.2	11.129
12	11 7 47.60	2.3405	6 31 8.1	11.174
13	11 10 8.00	2.3396	6 19 56.3	11.219
14	11 12 28.35	2.3387	6 8 41.8	11.262
15	11 14 48.65	2.3379	5 57 24.8	11.303
16	11 17 8.90	2.3371	5 46 5.4	11.343
17	11 19 29.10	2.3363	5 34 43.6	11.382
18	11 21 49.25	2.3355	5 23 19.5	11.420
19	11 24 9.36	2.3347	5 11 53.2	11.457
20	11 26 29.42	2.3339	5 0 24.7	11.492
21	11 28 49.43	2.3332	4 48 54.2	11.525
22	11 31 9.40	2.3325	4 37 21.7	11.558
23	11 33 29.33	2.3318	N. 4 25 47.2	11.590

SUNDAY 24

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
0	11 35 49.22	2.3312	N. 4 14 10.9	11.619
1	11 38 9.07	2.3305	4 2 32.9	11.647
2	11 40 28.88	2.3299	3 50 53.2	11.675
3	11 42 48.66	2.3293	3 39 11.9	11.701
4	11 45 8.40	2.3287	3 27 29.1	11.725
5	11 47 28.11	2.3282	3 15 44.9	11.747
6	11 49 47.78	2.3276	3 3 59.4	11.769
7	11 52 7.42	2.3271	2 52 12.6	11.790
8	11 54 27.03	2.3267	2 40 24.6	11.808
9	11 56 46.62	2.3262	2 28 35.6	11.825
10	11 59 6.18	2.3257	2 16 45.6	11.842
11	12 1 25.71	2.3253	2 4 54.6	11.857
12	12 3 45.22	2.3250	1 53 2.7	11.871
13	12 6 4.71	2.3246	1 41 10.1	11.883
14	12 8 24.17	2.3242	1 29 16.8	11.893
15	12 10 43.61	2.3238	1 17 22.9	11.902
16	12 13 3.03	2.3235	1 5 28.5	11.910
17	12 15 22.43	2.3232	0 53 33.7	11.917
18	12 17 41.82	2.3230	0 41 38.5	11.922
19	12 20 1.19	2.3228	0 29 43.0	11.926
20	12 22 20.55	2.3226	0 17 47.4	11.927
21	12 24 39.90	2.3224	N. 0 5 51.7	11.928
22	12 26 59.24	2.3222	S. 0 6 4.0	11.927
23	12 29 18.56	2.3219	0 17 59.6	11.926
24	12 31 37.87	2.3218	S. 0 29 55.1	11.923

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Name and Direction of Object.		Noon.	P. L. of Diff.	IIIh.	P. L. of Diff.	VIh.	P. L. of Diff.	IXh.	P. L. of Diff.
1	Sun	W.	48° 53′ 9″	2779	50° 28′ 5″	2798	52° 2′ 35″	2818	53° 36′ 39″	2838
	α Aquilæ	E.	64 14 49	3048	62 45 36	3086	61 17 9	3125	59 49 30	3166
	Fomalhaut	E.	96 50 15	2763	95 14 58	2779	93 40 3	2797	92 5 31	2815
2	Sun	W.	61 20 35	2937	62 52 7	2957	64 23 14	2976	65 53 57	2995
	α Aquilæ	E.	52 44 18	3406	51 22 8	3463	50 1 2	3523	48 41 3	3587
	Fomalhaut	E.	84 18 50	2911	82 46 45	2931	81 15 6	2952	79 43 53	2973
	α Pegasi	E.	99 1 41	2891	97 29 11	2907	95 57 1	2923	94 25 11	2939
3	Sun	W.	73 21 39	3087	74 50 4	3105	76 18 7	3122	77 45 50	3139
	Mars	W.	25 40 13	3108	27 8 13	3113	28 36 7	3119	30 3 53	3128
	α Aquilæ	E.	42 19 59	3983	41 8 3	4083	39 57 45	4193	38 49 12	4311
	Fomalhaut	E.	72 14 30	3083	70 46 0	3106	69 17 58	3130	67 50 25	3153
	α Pegasi	E.	86 51 21	3026	85 21 40	3043	83 52 20	3060	82 23 22	3078
4	Sun	W.	84 59 24	3219	86 25 11	3234	87 50 40	3248	89 15 52	3262
	Mars	W.	37 20 4	3175	38 46 43	3186	40 13 9	3196	41 39 23	3206
	Antares	W.	29 23 43	3119	30 51 30	3110	32 19 28	3103	33 47 34	3098
	Fomalhaut	E.	60 39 59	3282	59 15 26	3308	57 51 24	3337	56 27 55	3366
	α Pegasi	E.	75 4 2	3169	73 37 16	3188	72 10 52	3206	70 44 50	3225
5	Sun	W.	96 18 2	3324	97 41 46	3336	99 5 16	3346	100 28 34	3357
	Mars	W.	48 47 32	3256	50 12 35	3265	51 37 28	3274	53 2 10	3282
	Antares	W.	41 8 51	3096	42 37 5	3098	44 5 17	3101	45 33 26	3104
	Fomalhaut	E.	49 39 17	3532	48 19 28	3570	47 0 21	3610	45 41 58	3653
	α Pegasi	E.	63 40 20	3323	62 16 35	3344	60 53 14	3365	59 30 17	3386
6	Sun	W.	107 22 20	3400	108 44 36	3408	110 6 44	3415	111 28 44	3421
	Mars	W.	60 3 22	3319	61 27 11	3325	62 50 53	3331	64 14 29	3336
	Antares	W.	52 53 18	3118	54 21 6	3121	55 48 50	3124	57 16 31	3127
	Fomalhaut	E.	39 22 40	3924	38 9 45	3993	36 57 59	4070	35 47 28	4154
	α Pegasi	E.	52 41 58	3507	51 21 42	3535	50 1 56	3563	48 42 41	3593
	α Arietis	E.	94 54 6	3159	93 27 8	3166	92 0 18	3172	90 33 35	3177
7	Sun	W.	118 17 6	3446	119 38 30	3450	120 59 50	3454	122 21 6	3456
	Mars	W.	71 11 5	3358	72 34 10	3360	73 57 12	3363	75 20 11	3365
	Antares	W.	64 34 10	3137	66 1 35	3138	67 28 59	3139	68 56 21	3140
	α Pegasi	E.	42 15 28	3782	41 0 7	3829	39 45 35	3881	38 31 56	3939
	α Arietis	E.	83 21 33	3201	81 55 25	3206	80 29 23	3209	79 3 25	3214
8	Sun	W.	129 6 46	3465	130 27 49	3466	131 48 51	3466	133 9 53	3466
	Mars	W.	82 14 37	3371	83 37 27	3371	85 0 17	3370	86 23 8	3369
	Antares	W.	76 13 2	3140	77 40 23	3139	79 7 45	3138	80 35 8	3138
	α Aquilæ	W.	36 19 36	4759	37 19 46	4646	38 21 31	4546	39 24 43	4453
	α Arietis	E.	71 54 37	3230	70 29 3	3232	69 3 32	3235	67 38 4	3238
	Aldebaran	E.	103 59 55	3073	102 31 13	3073	101 2 31	3073	99 33 49	3073
9	Mars	W.	93 17 42	3360	94 40 44	3358	96 3 49	3356	97 26 56	3353
	Antares	W.	87 52 30	3128	89 20 6	3125	90 47 45	3122	92 15 28	3119
	α Aquilæ	W.	44 59 9	4105	46 9 6	4051	47 19 55	4002	48 31 33	3955
	α Arietis	E.	60 31 36	3253	59 6 29	3256	57 41 26	3259	56 16 27	3263
	Aldebaran	E.	92 9 58	3065	90 41 5	3062	89 12 9	3059	87 43 9	3056

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Month.	Name and Direction of Object.		Midnight.	P. L. of Diff.	XVh.	P. L. of Diff.	XVIIIh.	P. L. of Diff.	XXIh.	P. L. of Diff.
1	Sun	W.	55 10 17	2859	56 43 29	2878	58 16 16	[illegible]	59 48 38	2917
	α Aquilæ	E.	58 22 40	3209	56 56 42	3254	55 31 37	3308	54 7 28	3353
	Fomalhaut	E.	90 31 22	2833	88 57 37	2852	87 24 16	2871	85 51 20	2891
2	Sun	W.	67 24 16	3014	68 54 11	3033	70 23 43	3052	71 52 52	3069
	α Aquilæ	E.	47 22 14	3655	46 4 39	3738	44 48 22	3807	43 33 27	3898
	Fomalhaut	E.	78 13 6	2994	76 42 46	3016	75 12 53	3039	73 43 28	3060
	α Pegasi	E.	92 53 42	2967	91 22 35	2973	89 51 49	2990	88 21 24	3006
3	Sun	W.	79 13 12	3156	80 40 14	3173	82 6 56	3188	83 33 19	3204
	Mars	W.	31 31 29	3136	32 58 55	3145	34 26 10	3156	35 53 13	3165
	α Aquilæ	E.	37 42 30	4443	36 37 47	4587	35 35 11	4747	34 34 51	4925
	Fomalhaut	E.	66 23 20	3178	64 56 44	3203	63 30 38	3229	62 5 3	3255
	α Pegasi	E.	80 54 46	3096	79 26 32	3114	77 58 40	3133	76 31 10	3151
4	Sun	W.	90 40 48	3275	92 5 29	3288	93 29 54	3300	94 54 5	3313
	Mars	W.	43 5 25	3216	44 31 15	3226	45 56 53	3237	47 22 18	3247
	Antares	W.	35 15 46	3096	36 44 1	3094	38 12 18	3104	39 40 35	3096
	Fomalhaut	E.	55 5 0	3396	53 42 39	3428	52 20 54	3461	50 59 46	3496
	α Pegasi	E.	69 19 10	3344	67 53 53	3364	66 28 59	3383	65 4 28	3393
5	Sun	W.	101 51 40	3366	103 14 35	3375	104 37 20	3384	105 59 55	3393
	Mars	W.	54 26 42	3290	55 51 5	3298	57 15 19	3305	58 39 25	3313
	Antares	W.	47 1 31	3106	48 29 33	3109	49 57 32	3112	51 25 27	3115
	Fomalhaut	E.	44 24 21	3700	43 7 34	3749	41 51 39	3803	40 36 40	3860
	α Pegasi	E.	58 7 45	3408	56 45 38	3431	55 23 57	3456	54 2 43	3481
6	Sun	W.	112 50 37	3427	114 12 23	3432	115 34 3	3438	116 55 37	3443
	Mars	W.	65 37 59	3341	67 1 23	3345	68 24 42	3350	69 47 56	3354
	Antares	W.	58 44 8	3129	60 11 42	3131	61 39 14	3133	63 6 43	3135
	Fomalhaut	E.	34 38 18	4248	33 30 37	4358	32 24 32	4469	31 20 13	4608
	α Pegasi	E.	47 23 59	3626	46 5 53	3661	44 48 24	3698	43 31 35	3738
	α Arietis	E.	89 6 58	3183	87 40 28	3188	86 14 4	3193	84 47 46	3197
7	Sun	W.	123 42 19	3459	125 3 29	3462	126 24 36	3463	127 45 42	3464
	Mars	W.	76 43 7	3367	78 6 1	3368	79 28 54	3369	80 51 46	3370
	Antares	W.	70 23 42	3141	71 51 2	3141	73 18 22	3141	74 45 42	3141
	α Pegasi	E.	37 19 16	4003	36 7 39	4073	34 57 11	4150	33 47 59	4240
	α Arietis	E.	77 37 32	3217	76 11 43	3230	74 45 57	3243	73 20 15	3256
8	Sun	W.	134 30 55	3466	135 51 57	3465	137 13 0	3464	138 34 4	3463
	Mars	W.	87 46 0	3368	89 8 53	3367	90 31 47	3365	91 54 43	3363
	Antares	W.	82 2 32	3136	83 29 58	3134	84 57 26	3132	86 24 57	3130
	α Aquilæ	W.	40 29 17	4360	41 35 6	4264	42 42 4	4204	43 50 7	4169
	α Arietis	E.	66 12 40	3241	64 47 19	3243	63 22 1	3247	61 56 47	3249
	Aldebaran	E.	98 5 6	3072	96 36 22	3070	95 7 36	3069	93 38 48	3067
9	Mars	W.	98 50 6	3350	100 13 20	3345	101 36 39	3342	103 0 2	3338
	Antares	W.	93 43 14	3116	95 11 4	3113	96 38 58	3109	98 6 57	3106
	α Aquilæ	W.	49 43 57	3914	50 57 3	3874	52 10 49	3838	53 25 12	3804
	α Arietis	E.	54 51 32	3267	53 26 42	3272	52 1 58	3278	50 37 21	3284
	Aldebaran	E.	86 14 5	3050	84 44 57	3049	83 15 45	3045	81 46 28	3042

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Name and Direction of Object.		Noon.	P. L. of Diff.	IIIh.	P. L. of Diff.	VIh.	P. L. of Diff.	IXh.	P. L. of Diff.
10	Antares	W.	99° 35′ 0″	3101	101° 3′ 8″	3098	102° 31′ 20″	3094	103° 59′ 37″	3090
	α Aquilæ	W.	54 40 10	3771	55 55 42	3742	57 11 45	3713	58 28 18	3687
	α Arietis	E.	49 12 51	3291	47 48 29	3298	46 24 15	3306	45 0 11	3317
	Aldebaran	E.	80 17 7	3037	78 47 40	3032	77 18 7	3027	75 48 28	3022
11	α Aquilæ	W.	64 57 38	3574	66 16 41	3555	67 36 5	3537	68 55 48	3520
	α Arietis	E.	38 3 24	3394	36 41 1	3417	35 19 4	3444	33 57 37	3475
	Aldebaran	E.	68 18 37	2995	66 48 18	2989	65 17 52	2983	63 47 18	2977
12	α Aquilæ	W.	75 38 56	3444	77 0 23	3431	78 22 4	3419	79 43 59	3407
	Fomalhaut	W.	42 34 49	3671	43 52 7	3624	45 10 15	3582	46 29 9	3542
	α Pegasi	W.	29 46 39	4405	30 51 56	4271	31 59 15	4155	33 8 24	4050
	Aldebaran	E.	56 12 26	2943	54 41 2	2937	53 9 30	2930	51 37 49	2923
	Pollux	E.	100 2 14	3016	98 32 21	3009	97 2 19	3001	95 32 8	2993
	Saturn	E.	100 9 1	2965	98 38 5	2958	97 7 0	2951	95 35 46	2944
13	α Aquilæ	W.	86 36 42	3358	87 59 47	3349	89 23 2	3340	90 46 27	3333
	Fomalhaut	W.	53 13 39	3382	54 36 16	3356	55 59 23	3331	57 22 59	3307
	α Pegasi	W.	39 16 39	3671	40 33 57	3615	41 52 15	3565	43 11 28	3517
	Aldebaran	E.	43 57 6	2886	42 24 29	2879	40 51 43	2871	39 18 47	2863
	Saturn	E.	87 57 18	2907	86 25 8	2899	84 52 48	2891	83 20 18	2884
	Pollux	E.	87 58 50	2957	86 27 43	2949	84 56 26	2942	83 25 0	2935
14	Fomalhaut	W.	64 27 19	3208	65 53 19	3190	67 19 40	3173	68 46 21	3158
	α Pegasi	W.	49 59 16	3333	51 22 49	3304	52 46 56	3276	54 11 36	3249
	Aldebaran	E.	31 31 39	2825	29 57 43	2817	28 23 37	2809	26 49 21	2801
	Saturn	E.	75 35 22	2845	74 1 52	2837	72 28 12	2829	70 54 22	2822
	Pollux	E.	75 45 38	2900	74 13 19	2893	72 40 51	2887	71 8 15	2880
	Regulus	E.	111 38 38	2825	110 4 43	2818	108 30 38	2810	106 56 23	2801
15	Fomalhaut	W.	76 4 12	3088	77 32 36	3076	79 1 15	3065	80 30 8	3054
	α Pegasi	W.	61 22 5	3139	62 49 27	3120	64 17 12	3102	65 45 19	3086
	Saturn	E.	63 2 39	2782	61 27 47	2773	59 52 44	2765	58 17 30	2757
	Pollux	E.	63 23 12	2850	61 49 49	2844	60 16 18	2838	58 42 40	2834
	Regulus	E.	99 2 28	2761	97 27 9	2753	95 51 39	2744	94 15 58	2737
16	Fomalhaut	W.	87 57 52	3002	89 28 2	2994	90 58 22	2985	92 28 53	2977
	α Pegasi	W.	73 10 50	3009	74 40 51	2996	76 11 9	2983	77 41 43	2970
	α Arietis	W.	29 57 4	3282	31 21 36	3221	32 47 20	3168	34 14 8	3119
	Saturn	E.	50 18 42	2716	48 42 24	2708	47 5 55	2700	45 29 15	2692
	Pollux	E.	50 53 0	2813	49 18 49	2811	47 44 35	2808	46 10 18	2806
	Regulus	E.	86 14 48	2694	84 38 0	2685	83 1 0	2677	81 23 49	2668
17	Fomalhaut	W.	100 3 49	2943	101 35 13	2938	103 6 44	2933	104 38 21	2929
	α Arietis	W.	41 41 2	2939	43 12 32	2911	44 44 37	2885	46 17 15	2860
	Saturn	E.	37 23 15	2652	35 45 31	2645	34 7 37	2638	32 29 33	2629
	Pollux	E.	38 18 51	2815	36 44 43	2821	35 10 43	2830	33 36 54	2842
	Regulus	E.	73 14 52	2623	71 36 28	2614	69 57 52	2604	68 19 3	2596
	Sun	E.	128 45 11	2978	127 14 31	2968	125 43 38	2958	124 12 32	2947
18	α Arietis	W.	54 7 47	2756	55 43 12	2738	57 19 1	2721	58 55 13	2704
	Aldebaran	W.	20 6 14	2547	21 46 22	2537	23 26 44	2527	25 7 20	2517

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Name and Direction of Object.		Noon.	P. L. of Diff.	IIIh.	P. L. of Diff.	VIh	P. L. of Diff.	IXh.	P. L. of Diff.
			° ′ ″		° ′ ″		° ′ ″		° ′ ″	
18	Regulus	E.	60 1 43	2547	58 21 35	2538	56 41 14	2527	55 0 39	2518
	Sun	E.	116 33 41	2894	115 1 14	2883	113 28 33	2872	111 55 38	[illegible]
19	α Arietis	W.	67 1 34	2628	68 39 51	2614	70 18 27	2601	71 57 21	2567
	Aldebaran	W.	33 33 52	2465	35 15 54	2455	36 58 10	2445	38 40 41	2435
	Regulus	E.	46 34 16	2467	44 52 17	2457	43 10 3	2447	41 27 35	2426
	Sun	E.	104 7 34	2806	102 33 14	2795	100 58 39	2784	99 23 50	2772
20	α Arietis	W.	80 16 22	2524	81 57 2	2512	83 37 58	2501	85 19 10	2489
	Aldebaran	W.	47 16 58	2382	49 0 58	2371	50 45 14	2361	52 29 45	2350
	Regulus	E.	32 51 33	2385	31 7 37	2375	29 23 26	2364	27 39 0	2355
	Sun	E.	91 26 1	2716	89 49 43	2704	88 13 9	2693	86 36 20	2683
21	α Arietis	W.	93 48 56	2438	95 31 36	2429	97 14 29	2421	98 57 34	2412
	Aldebaran	W.	61 16 6	2299	63 2 7	2289	64 48 23	2279	66 34 53	2270
	Saturn	W.	17 18 19	2380	19 2 23	2357	20 46 59	2338	22 32 3	2321
	Sun	E.	78 28 36	2629	76 50 20	2618	75 11 49	2607	73 33 4	2597
22	α Arietis	W.	107 35 46	2378	109 19 52	2373	111 4 6	2368	112 48 26	2364
	Aldebaran	W.	75 30 54	2223	77 18 47	2215	79 6 52	2206	80 55 10	2198
	Pollux	W.	32 58 15	2457	34 40 29	2428	36 23 24	2403	38 6 55	2380
	Saturn	W.	31 22 55	2255	33 10 1	2244	34 57 23	2233	36 45 1	2224
	Sun	E.	65 15 56	2550	63 35 52	2541	61 55 36	2533	60 15 8	2525
23	Aldebaran	W.	89 59 32	2163	91 48 56	2157	93 38 29	2152	95 28 9	2147
	Pollux	W.	46 51 54	2291	48 38 6	2279	50 24 37	2267	52 11 25	2257
	Saturn	W.	45 46 33	2182	47 35 27	2176	49 24 31	2169	51 13 45	2163
	Sun	E.	51 50 13	2491	50 8 47	2485	48 27 13	2480	46 45 32	2477
24	Aldebaran	W.	104 38 18	2127	106 28 36	2124	108 18 58	2122	110 9 23	2121
	Pollux	W.	61 8 56	2216	62 57 0	2211	64 45 11	2206	66 33 29	2203
	Saturn	W.	60 21 54	2141	62 11 50	2139	64 1 50	2136	65 51 54	2135
	Sun	E.	38 15 59	2465	36 33 57	2466	34 51 56	2467	33 9 57	2470
28	Sun	W.	16 40 12	2787	18 14 57	2779	19 49 52	2777	21 24 50	2780
	α Aquilæ	E.	69 29 54	2880	67 57 9	2909	66 25 1	2939	64 53 31	2970
	Fomalhaut	E.	102 18 17	2645	100 40 23	2655	99 2 43	2666	97 25 18	2679
29	Sun	W.	29 17 38	2827	30 51 31	2841	32 25 6	2855	33 58 23	2869
	α Aquilæ	E.	57 26 50	3163	55 59 57	3209	54 33 58	3258	53 8 57	3310
	Fomalhaut	E.	89 22 47	2753	87 47 18	2771	86 12 12	2788	84 37 29	2806
	α Pegasi	E.	104 12 27	2756	102 37 1	2769	101 1 52	2782	99 27 0	2795
30	Sun	W.	41 39 52	2950	43 11 8	2967	44 42 2	2984	46 12 35	3001
	α Aquilæ	E.	46 20 18	3633	45 2 19	3712	43 45 45	3800	42 30 43	3894
	Fomalhaut	E.	76 50 4	2908	75 17 55	2929	73 46 13	2952	72 15 0	2974
	α Pegasi	E.	91 37 25	2873	90 4 32	2890	88 32 0	2907	86 59 50	2925
31	Sun	W.	53 40 0	3087	55 8 26	3103	56 36 32	3120	58 4 17	3137
	Antares	W.	25 3 32	3060	26 32 30	3040	28 1 53	3096	29 31 34	3015
	Fomalhaut	E.	64 46 20	3100	63 18 10	3127	61 50 33	3154	60 23 29	3183
	α Pegasi	E.	79 24 48	3019	77 54 59	3039	76 25 35	3060	74 56 36	3079

AT GREENWICH APPARENT NOON.

Day of the Week.	Day of the Month.	THE SUN'S Apparent Right Ascension.	Diff. for 1 Hour.	Apparent Declination.	Diff. for 1 Hour.	Semi-diameter.	Sidereal Time of Semi-diameter Passing Meridian.	Equation of Time, to be Subtracted from Apparent Time.	Diff. for 1 Hour.
		h m s	s	° ′ ″	″	′ ″	s	m s	s
Mon.	1	14 26 26.88	9.806	S. 14 30 19.4	−48.00	16 9.84	66.96	16 17.54	0.049
Tues.	2	14 30 22.62	9.840	14 49 24.5	47.41	16 10.09	67.08	16 18.35	0.016
Wed.	3	14 34 19.15	9.873	15 8 15.0	46.80	16 10.34	67.20	16 18.37	0.017
Thur.	4	14 38 16.48	9.906	15 26 50.6	−46.17	16 10.59	67.32	16 17.60	0.050
Frid.	5	14 42 14.61	9.939	15 45 10.9	45.52	16 10.84	67.44	16 16.03	0.083
Sat.	6	14 46 13.56	9.973	16 3 15.4	44.85	16 11.08	67.55	16 13.65	0.117
SUN.	7	14 50 13.33	10.007	16 21 3.7	−44.17	16 11.32	67.67	16 10.44	0.151
Mon.	8	14 54 13.93	10.042	16 38 35.5	43.47	16 11.56	67.79	16 6.40	0.186
Tues.	9	14 58 15.36	10.077	16 55 50.3	42.76	16 11.79	67.91	16 1.53	0.221
Wed.	10	15 2 17.63	10.112	17 12 47.9	−42.03	16 12.01	68.02	15 55.84	0.256
Thur.	11	15 6 20.75	10.147	17 29 27.8	41.28	16 12.24	68.14	15 49.30	0.291
Frid.	12	15 10 24.72	10.183	17 45 49.6	40.52	16 12.46	68.26	15 41.90	0.327
Sat.	13	15 14 29.55	10.219	18 1 52.8	−39.74	16 12.67	68.38	15 33.63	0.363
SUN.	14	15 18 35.24	10.255	18 17 37.0	38.94	16 12.88	68.50	15 24.52	0.399
Mon.	15	15 22 41.79	10.291	18 33 1.9	38.13	16 13.09	68.62	15 14.56	0.435
Tues.	16	15 26 49.19	10.326	18 48 7.3	−37.30	16 13.30	68.74	15 3.74	0.470
Wed.	17	15 30 57.46	10.361	19 2 52.6	36.46	16 13.50	68.86	14 52.06	0.505
Thur.	18	15 35 6.58	10.397	19 17 17.6	35.60	16 13.69	68.97	14 39.54	0.540
Frid.	19	15 39 16.54	10.432	19 31 21.9	−34.73	16 13.88	69.09	14 26.17	0.575
Sat.	20	15 43 27.34	10.467	19 45 5.1	33.84	16 14.07	69.20	14 11.96	0.610
SUN.	21	15 47 38.97	10.501	19 58 26.7	32.94	16 14.26	69.31	13 56.92	0.644
Mon.	22	15 51 51.44	10.535	20 11 26.5	−32.02	16 14.44	69.42	13 41.06	0.678
Tues.	23	15 56 4.71	10.568	20 24 4.0	31.09	16 14.62	69.53	13 24.39	0.711
Wed.	24	16 0 18.77	10.601	20 36 18.9	30.14	16 14.80	69.63	13 6.93	0.744
Thur.	25	16 4 33.61	10.634	20 48 10.9	−29.18	16 14.98	69.74	12 48.70	0.776
Frid.	26	16 8 49.20	10.665	20 59 39.7	28.20	16 15.15	69.84	12 29.70	0.807
Sat.	27	16 13 5.52	10.695	21 10 44.9	27.21	16 15.32	69.94	12 9.99	0.837
SUN.	28	16 17 22.55	10.724	21 21 26.1	−26.20	16 15.49	70.04	11 49.58	0.866
Mon.	29	16 21 40.27	10.752	21 31 42.9	25.18	16 15.65	70.14	11 28.47	0.894
Tues.	30	16 25 58.67	10.780	21 41 35.2	24.15	16 15.81	70.23	11 6.69	0.922
Wed.	31	16 30 17.71	10.806	S. 21 51 2.5	−23.11	16 15.97	70.32	10 44.27	0.948

NOTE.—The mean time of semidiameter passing may be found by subtracting 0s.19 from the sidereal time.
The sign − prefixed to the hourly change of declination indicates that south declinations are increasing.

AT GREENWICH MEAN NOON.

Day of the Month.	Day of the Year.	THE SUN'S TRUE LONGITUDE. λ	THE SUN'S TRUE LONGITUDE. λ′	Diff. for 1 Hour.	LATITUDE.	Logarithm of the Radius Vector of the Earth.	Diff. for 1 Hour.	Mean Time of Sidereal Noon.
		° ′ ″	′ ″	″	″			h m s
1	305	219 1 14.5	0 41.6	150.28	+ 0.68	9.9964765	− 47.3	9 15 41.63
2	306	220 1 21.9	0 48.9	150.34	0.59	9.9963632	47.0	9 11 45.73
3	307	221 1 30.9	0 57.8	150.40	0.48	9.9962508	46.6	9 7 49.82
4	308	222 1 41.5	1 8.3	150.46	+ 0.35	9.9961394	− 46.2	9 3 53.92
5	309	223 1 53.6	1 20.3	150.53	0.21	9.9960291	45.7	8 59 58.01
6	310	224 2 7.2	1 33.7	150.59	+ 0.07	9.9959201	45.1	8 56 2.10
7	311	225 2 22.3	1 48.7	150.65	− 0.07	9.9958126	− 44.5	8 52 6.18
8	312	226 2 38.9	2 5.2	150.72	0.19	9.9957068	43.8	8 48 10.27
9	313	227 2 57.0	2 23.2	150.78	0.28	9.9956028	43.0	8 44 14.36
10	314	228 3 16.7	2 42.8	150.84	− 0.34	9.9955006	− 42.2	8 40 18.45
11	315	229 3 38.0	3 3.9	150.91	0.38	9.9954003	41.4	8 36 22.54
12	316	230 4 0.9	3 26.7	150.98	0.39	9.9953020	40.6	8 32 26.63
13	317	231 4 25.5	3 51.2	151.05	− 0.37	9.9952057	− 39.8	8 28 30.72
14	318	232 4 51.9	4 17.5	151.13	0.33	9.9951112	39.0	8 24 34.81
15	319	233 5 20.0	4 45.4	151.20	0.26	9.9950187	38.2	8 20 38.90
16	320	234 5 49.9	5 15.1	151.28	− 0.17	9.9949281	− 37.4	8 16 42.99
17	321	235 6 21.7	5 46.8	151.36	− 0.05	9.9948393	36.6	8 12 47.08
18	322	236 6 55.3	6 20.3	151.44	+ 0.08	9.9947523	35.9	8 8 51.17
19	323	237 7 30.6	6 55.5	151.51	+ 0.21	9.9946669	− 35.3	8 4 55.27
20	324	238 8 7.7	7 32.4	151.58	0.34	9.9945829	34.7	8 0 59.36
21	325	239 8 46.5	8 11.0	151.64	0.46	9.9945003	34.1	7 57 3.45
22	326	240 9 26.9	8 51.3	151.70	+ 0.57	9.9944189	− 33.6	7 53 7.54
23	327	241 10 9.0	9 33.3	151.77	0.65	9.9943389	33.0	7 49 11.63
24	328	242 10 52.6	10 16.8	151.84	0.70	9.9942602	32.5	7 45 15.72
25	329	243 11 37.7	11 1.7	151.90	+ 0.72	9.9941827	− 32.0	7 41 19.81
26	330	244 12 24.2	11 48.0	151.96	0.71	9.9941063	31.6	7 37 23.90
27	331	245 13 11.9	12 35.6	152.01	0.68	9.9940310	31.1	7 33 27.99
28	332	246 14 0.8	13 24.4	152.06	+ 0.62	9.9939569	− 30.6	7 29 32.08
29	333	247 14 50.7	14 14.1	152.10	0.53	9.9938842	30.0	7 25 36.17
30	334	248 15 41.6	15 4.8	152.14	0.41	9.9938129	29.4	7 21 40.26
31	335	249 16 33.5	15 56.5	152.18	+ 0.28	9.9937430	− 28.8	7 17 44.35

NOTE.—The numbers in column λ correspond to the true equinox of the date; in column λ′, to the mean equinox of January $0^d.0$.

Diff. for 1 Hour, —$9^s.8296$. (Table II.)

GREENWICH MEAN TIME.

THE MOON'S

Day of the Month.	SEMIDIAMETER. Noon.	SEMIDIAMETER. Midnight.	HORIZONTAL PARALLAX. Noon.	Diff. for 1 Hour.	HORIZONTAL PARALLAX. Midnight.	Diff. for 1 Hour.	UPPER TRANSIT. Meridian of Greenwich.	Diff. for 1 Hour.	AGE. Noon.
	′ ″	′ ″	′ ″	″	′ ″	″	h m	m	d
1	15 12.9	15 7.5	56 43.5	−1.72	55 23.8	−1.56	4 26.4	2.09	5.2
2	15 2.7	14 58.5	55 6.2	1.38	54 50.8	1.18	5 15.6	2.00	6.2
3	14 55.0	14 52.2	54 37.9	0.97	54 27.6	0.75	6 2.7	1.92	7.2
4	14 50.1	14 48.7	54 19.8	−0.54	54 14.6	−0.32	6 48.0	1.85	8.2
5	14 48.0	14 48.0	54 12.1	−0.11	54 12.0	+0.09	7 31.9	1.80	9.2
6	14 48.6	14 49.8	54 14.3	+0.28	54 18.8	0.47	8 14.8	1.78	10.2
7	14 51.7	14 54.0	54 25.5	+0.64	54 34.1	+0.79	8 57.6	1.79	11.2
8	14 56.8	15 0.0	54 44.4	0.93	54 56.3	1.04	9 40.8	1.82	12.2
9	15 3.6	15 7.5	55 9.4	1.13	55 23.5	1.21	10 25.0	1.88	13.2
10	15 11.5	15 15.7	55 38.3	+1.26	55 53.8	+1.30	11 11.0	1.96	14.2
11	15 20.0	15 24.3	56 9.5	1.31	56 25.2	1.31	11 59.3	2.06	15.2
12	15 28.5	15 32.7	56 40.9	1.30	56 56.3	1.26	12 50.0	2.17	16.2
13	15 36.8	15 40.7	57 11.2	+1.22	57 25.6	+1.17	13 43.2	2.26	17.2
14	15 44.4	15 48.0	57 39.3	1.11	57 52.3	1.06	14 38.1	2.32	18.2
15	15 51.3	15 54.5	58 4.6	1.00	58 16.2	0.93	15 34.1	2.34	19.2
16	15 57.4	16 0.2	58 27.0	+0.87	58 37.1	+0.81	16 30.1	2.32	20.2
17	16 2.7	16 5.0	58 46.4	0.74	58 54.9	0.67	17 25.2	2.27	21.2
18	16 7.1	16 8.9	59 2.5	0.60	59 9.3	0.53	18 19.2	2.22	22.2
19	16 10.5	16 11.8	59 15.1	+0.43	59 19.7	+0.33	19 12.1	2.18	23.2
20	16 12.7	16 13.2	59 23.0	+0.22	59 24.9	+0.09	20 4.2	2.16	24.2
21	16 13.2	16 12.8	59 25.1	−0.06	59 23.5	−0.21	20 56.0	2.16	25.2
22	16 11.8	16 10.3	59 20.0	−0.38	59 14.4	−0.56	21 48.1	2.18	26.2
23	16 8.2	16 5.5	59 6.6	0.74	58 56.6	0.93	22 40.9	2.22	27.2
24	16 2.2	15 58.3	58 44.4	1.10	58 30.2	1.26	23 34.5	2.25	28.2
25	15 53.9	15 49.1	58 14.2	−1.40	57 56.6	−1.53	6		29.2
26	15 44.0	15 38.5	57 37.6	1.62	57 17.7	1.68	0 28.5	2.25	0.7
27	15 33.0	15 27.4	56 57.3	1.71	56 36.6	1.71	1 22.4	2.23	1.7
28	15 21.8	15 16.4	56 16.2	−1.68	55 56.3	−1.61	2 15.2	2.17	2.7
29	15 11.3	15 6.5	55 37.5	1.52	55 19.9	1.40	3 6.2	2.08	3.7
30	15 2.1	14 58.3	55 3.9	1.25	54 49.9	1.08	3 55.1	1.99	4.7
31	14 55.0	14 52.4	54 37.9	−0.90	54 28.3	−0.70	4 41.8	1.90	5.7

GREENWICH MEAN TIME.

THE MOON'S RIGHT ASCENSION AND DECLINATION.

MONDAY 1.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
	h m s	s	° ′ ″	″
0	19 0 9.20	2.2002	S. 18 46 26.3	1.483
1	19 2 21.12	2.1971	18 44 54.5	1.577
2	19 4 32.85	2.1940	18 43 17.0	1.671
3	19 6 44.40	2.1909	18 41 33.9	1.765
4	19 8 55.76	2.1878	18 39 45.2	1.858
5	19 11 6.94	2.1847	18 37 50.9	1.951
6	19 13 17.93	2.1816	18 35 51.1	2.043
7	19 15 28.73	2.1784	18 33 45.8	2.134
8	19 17 39.34	2.1752	18 31 35.0	2.226
9	19 19 49.75	2.1720	18 29 18.7	2.317
10	19 21 59.98	2.1688	18 26 57.0	2.407
11	19 24 10.01	2.1656	18 24 29.9	2.496
12	19 26 19.85	2.1623	18 21 57.5	2.584
13	19 28 29.49	2.1591	18 19 19.8	2.673
14	19 30 38.94	2.1559	18 16 36.7	2.762
15	19 32 48.20	2.1527	18 13 48.3	2.850
16	19 34 57.26	2.1494	18 10 54.7	2.936
17	19 37 6.13	2.1462	18 7 56.0	3.022
18	19 39 14.80	2.1429	18 4 52.1	3.108
19	19 41 23.28	2.1397	18 1 43.0	3.194
20	19 43 31.56	2.1363	17 58 28.8	3.278
21	19 45 39.64	2.1330	17 55 9.6	3.363
22	19 47 47.52	2.1297	17 51 45.3	3.447
23	19 49 55.21	2.1265	S. 17 48 16.0	3.529

TUESDAY 2.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
0	19 52 2.70	2.1232	S. 17 44 41.8	3.612
1	19 54 9.99	2.1199	17 41 2.6	3.694
2	19 56 17.09	2.1167	17 37 18.5	3.776
3	19 58 23.99	2.1134	17 33 29.5	3.858
4	20 0 30.70	2.1101	17 29 35.6	3.938
5	20 2 37.21	2.1068	17 25 36.9	4.017
6	20 4 43.52	2.1036	17 21 33.5	4.097
7	20 6 49.64	2.1003	17 17 25.3	4.176
8	20 8 55.56	2.0971	17 13 12.4	4.254
9	20 11 1.29	2.0938	17 8 54.8	4.332
10	20 13 6.82	2.0906	17 4 32.6	4.409
11	20 15 12.16	2.0873	17 0 5.8	4.486
12	20 17 17.30	2.0841	16 55 34.3	4.562
13	20 19 22.25	2.0809	16 50 58.3	4.637
14	20 21 27.01	2.0777	16 46 17.8	4.712
15	20 23 31.57	2.0744	16 41 32.9	4.786
16	20 25 35.94	2.0712	16 36 43.5	4.860
17	20 27 40.12	2.0681	16 31 49.7	4.933
18	20 29 44.11	2.0649	16 26 51.5	5.007
19	20 31 47.91	2.0617	16 21 48.9	5.079
20	20 33 51.52	2.0587	16 16 42.0	5.150
21	20 35 54.95	2.0556	16 11 30.9	5.220
22	20 37 58.19	2.0524	16 6 15.6	5.290
23	20 40 1.24	2.0493	16 0 56.1	5.360
24	20 42 4.11	2.0463	S. 15 55 32.4	5.430

WEDNESDAY 3.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
	h m s	s	° ′ ″	″
0	20 42 4.11	2.0463	S. 15 55 32.4	5.430
1	20 44 6.80	2.0432	15 50 4.5	5.499
2	20 46 9.30	2.0401	15 44 32.5	5.567
3	20 48 11.61	2.0370	15 38 56.4	5.635
4	20 50 13.74	2.0341	15 33 16.3	5.702
5	20 52 15.70	2.0312	15 27 32.2	5.768
6	20 54 17.48	2.0282	15 21 44.1	5.834
7	20 56 19.08	2.0252	15 15 52.1	5.900
8	20 58 20.51	2.0223	15 9 56.1	5.966
9	21 0 21.76	2.0194	15 3 56.2	6.030
10	21 2 22.84	2.0165	14 57 52.5	6.093
11	21 4 23.74	2.0136	14 51 45.1	6.155
12	21 6 24.47	2.0108	14 45 33.9	6.218
13	21 8 25.03	2.0080	14 39 18.9	6.281
14	21 10 25.43	2.0052	14 33 0.2	6.343
15	21 12 25.66	2.0024	14 26 37.8	6.403
16	21 14 25.72	1.9997	14 20 11.8	6.463
17	21 16 25.62	1.9970	14 13 42.2	6.524
18	21 18 25.36	1.9943	14 7 8.9	6.584
19	21 20 24.94	1.9917	14 0 32.1	6.643
20	21 22 24.36	1.9890	13 53 51.8	6.701
21	21 24 23.62	1.9864	13 47 8.0	6.758
22	21 26 22.73	1.9838	13 40 20.8	6.815
23	21 28 21.68	1.9812	S. 13 33 30.2	6.872

THURSDAY 4.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
0	21 30 20.48	1.9787	S. 13 26 36.2	6.928
1	21 32 19.13	1.9762	13 19 38.9	6.983
2	21 34 17.63	1.9737	13 12 38.2	7.039
3	21 36 15.98	1.9713	13 5 34.2	7.093
4	21 38 14.19	1.9690	12 58 27.0	7.148
5	21 40 12.26	1.9666	12 51 16.5	7.202
6	21 42 10.18	1.9642	12 44 2.8	7.254
7	21 44 7.96	1.9619	12 36 46.0	7.307
8	21 46 5.61	1.9596	12 29 26.0	7.359
9	21 48 3.12	1.9573	12 22 2.9	7.410
10	21 50 0.49	1.9552	12 14 36.8	7.461
11	21 51 57.74	1.9531	12 7 7.6	7.512
12	21 53 54.86	1.9509	11 59 35.4	7.561
13	21 55 51.85	1.9488	11 52 0.3	7.610
14	21 57 48.72	1.9467	11 44 22.2	7.659
15	21 59 45.46	1.9447	11 36 41.2	7.707
16	22 1 42.08	1.9427	11 28 57.3	7.755
17	22 3 38.58	1.9407	11 21 10.6	7.803
18	22 5 34.96	1.9388	11 13 21.0	7.850
19	22 7 31.23	1.9369	11 5 28.6	7.896
20	22 9 27.39	1.9350	10 57 33.5	7.941
21	22 11 23.43	1.9331	10 49 35.7	7.986
22	22 13 19.36	1.9313	10 41 35.2	8.031
23	22 15 15.19	1.9296	10 33 32.0	8.075
24	22 17 10.92	1.9279	S. 10 25 26.2	8.118

GREENWICH MEAN TIME.

THE MOON'S RIGHT ASCENSION AND DECLINATION.

WEDNESDAY 17.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
	h m s	s	° ′ ″	″
0	8 32 37.38	2.3874	N.16 28 24.8	5.902
1	8 35 0.58	2.3858	16 22 27.6	6.004
2	8 37 23.68	2.3843	16 16 24.3	6.107
3	8 39 46.69	2.3827	16 10 14.8	6.209
4	8 42 9.60	2.3810	16 3 59.2	6.310
5	8 44 32.41	2.3793	15 57 37.6	6.411
6	8 46 55.12	2.3776	15 51 9.9	6.511
7	8 49 17.72	2.3759	15 44 36.3	6.609
8	8 51 40.22	2.3743	15 37 56.8	6.708
9	8 54 2.63	2.3726	15 31 11.4	6.806
10	8 56 24.93	2.3708	15 24 20.1	6.903
11	8 58 47.12	2.3689	15 17 23.0	6.999
12	9 1 9.20	2.3671	15 10 20.2	7.094
13	9 3 31.17	2.3652	15 3 11.7	7.188
14	9 5 53.03	2.3634	14 55 57.6	7.282
15	9 8 14.78	2.3616	14 48 37.8	7.376
16	9 10 36.42	2.3597	14 41 12.5	7.468
17	9 12 57.94	2.3577	14 33 41.7	7.559
18	9 15 19.35	2.3558	14 26 5.4	7.650
19	9 17 40.64	2.3539	14 18 23.7	7.740
20	9 20 1.82	2.3521	14 10 36.6	7.829
21	9 22 22.89	2.3502	14 2 44.2	7.917
22	9 24 43.84	2.3482	13 54 46.6	8.003
23	9 27 4.68	2.3463	N.13 46 43.8	8.090

THURSDAY 18.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
0	9 29 25.40	2.3443	N.13 38 35.8	8.176
1	9 31 46.00	2.3423	13 30 22.7	8.260
2	9 34 6.48	2.3404	13 22 4.6	8.343
3	9 36 26.85	2.3385	13 13 41.5	8.426
4	9 38 47.10	2.3365	13 5 13.4	8.509
5	9 41 7.23	2.3346	12 56 40.4	8.590
6	9 43 27.25	2.3327	12 48 2.6	8.670
7	9 45 47.15	2.3307	12 39 20.0	8.749
8	9 48 6.93	2.3287	12 30 32.7	8.827
9	9 50 26.60	2.3268	12 21 40.7	8.905
10	9 52 46.15	2.3249	12 12 44.1	8.981
11	9 55 5.59	2.3230	12 3 43.0	9.056
12	9 57 24.91	2.3210	11 54 37.4	9.130
13	9 59 44.11	2.3191	11 45 27.4	9.203
14	10 2 3.20	2.3172	11 36 13.0	9.276
15	10 4 22.18	2.3154	11 26 54.2	9.349
16	10 6 41.05	2.3135	11 17 31.1	9.419
17	10 8 59.80	2.3116	11 8 3.9	9.488
18	10 11 18.44	2.3097	10 58 32.6	9.556
19	10 13 36.97	2.3079	10 48 57.2	9.624
20	10 15 55.39	2.3061	10 39 17.7	9.691
21	10 18 13.70	2.3043	10 29 34.3	9.756
22	10 20 31.91	2.3026	10 19 47.0	9.820
23	10 22 50.01	2.3007	10 9 55.9	9.883
24	10 25 8.00	2.2990	N.10 0 1.0	9.946

FRIDAY 19.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
	h m s	s	° ′ ″	″
0	10 25 8.00	2.2990	N.10 0 1.0	9.946
1	10 27 25.89	2.2972	9 50 2.4	10.007
2	10 29 43.67	2.2955	9 40 0.1	10.067
3	10 32 1.35	2.2938	9 29 54.3	10.126
4	10 34 18.93	2.2922	9 19 45.0	10.184
5	10 36 36.41	2.2906	9 9 32.2	10.242
6	10 38 53.80	2.2890	8 59 15.9	10.299
7	10 41 11.09	2.2873	8 48 56.3	10.353
8	10 43 28.28	2.2857	8 38 33.5	10.407
9	10 45 45.38	2.2842	8 28 7.5	10.460
10	10 48 2.39	2.2827	8 17 38.3	10.512
11	10 50 19.31	2.2812	8 7 6.1	10.562
12	10 52 36.13	2.2797	7 56 30.9	10.612
13	10 54 52.87	2.2782	7 45 52.7	10.661
14	10 57 9.52	2.2768	7 35 11.6	10.707
15	10 59 26.09	2.2755	7 24 27.8	10.753
16	11 1 42.58	2.2742	7 13 41.2	10.799
17	11 3 58.99	2.2728	7 2 51.9	10.843
18	11 6 15.31	2.2714	6 52 0.0	10.887
19	11 8 31.56	2.2702	6 41 5.5	10.928
20	11 10 47.74	2.2690	6 30 8.6	10.968
21	11 13 3.84	2.2678	6 19 9.3	11.008
22	11 15 19.87	2.2666	6 8 7.6	11.047
23	11 17 35.83	2.2655	N. 5 57 3.7	11.083

SATURDAY 20.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
0	11 19 51.73	2.2644	N. 5 45 57.6	11.119
1	11 22 7.56	2.2633	5 34 49.4	11.155
2	11 24 23.33	2.2622	5 23 39.0	11.190
3	11 26 39.03	2.2612	5 12 26.6	11.222
4	11 28 54.67	2.2602	5 1 12.3	11.253
5	11 31 10.26	2.2593	4 49 56.2	11.283
6	11 33 25.79	2.2584	4 38 38.3	11.313
7	11 35 41.27	2.2576	4 27 18.6	11.342
8	11 37 56.70	2.2567	4 15 57.3	11.368
9	11 40 12.08	2.2559	4 4 34.4	11.394
10	11 42 27.41	2.2552	3 53 10.0	11.419
11	11 44 42.70	2.2544	3 41 44.1	11.443
12	11 46 57.94	2.2537	3 30 16.8	11.466
13	11 49 13.14	2.2531	3 18 48.2	11.487
14	11 51 28.31	2.2525	3 7 18.4	11.506
15	11 53 43.44	2.2519	2 55 47.5	11.524
16	11 55 58.54	2.2514	2 44 15.5	11.542
17	11 58 13.61	2.2508	2 32 42.4	11.560
18	12 0 28.64	2.2503	2 21 8.3	11.576
19	12 2 43.65	2.2499	2 9 33.3	11.589
20	12 4 58.63	2.2495	1 57 57.6	11.601
21	12 7 13.59	2.2492	1 46 21.2	11.613
22	12 9 28.53	2.2488	1 34 44.1	11.624
23	12 11 43.45	2.2486	1 23 6.3	11.634
24	12 13 58.36	2.2483	N. 1 11 28.0	11.642

GREENWICH MEAN TIME.

THE MOON'S RIGHT AND

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Name and Direction of Object.		Midnight.	P. L. of Diff.	XVh.	P. L. of Diff.	XVIIIh.	P. L. of Diff.	XXIh.	P. L. of Diff.
			° ′ ″		° ′ ″		° ′ ″		° ′ ″	
9	Pollux	E.	85 38 1	2909	84 5 54	2899	82 33 34	2890	81 1 2	2880
	Saturn	E.	85 57 26	2844	84 23 55	2833	82 50 10	2823	81 16 12	2812
10	Fomalhaut	W.	66 48 7	3119	68 15 53	3101	69 44 1	3083	71 12 31	3066
	α Pegasi	W.	52 15 6	3240	53 40 28	3210	55 6 25	3182	56 32 56	3156
	Aldebaran	E.	28 58 48	2759	27 23 26	2748	25 47 50	2738	24 12 0	2728
	Pollux	E.	73 15 14	2832	71 41 28	2823	70 7 30	2814	68 33 20	2805
	Saturn	E.	73 22 57	2760	71 47 37	2750	70 12 3	2740	68 36 16	2729
11	Fomalhaut	W.	78 39 57	2991	80 10 21	2978	81 41 1	2966	83 11 56	2954
	α Pegasi	W.	63 52 56	3043	65 22 16	3024	66 51 59	3005	68 22 5	2988
	Saturn	E.	60 33 56	2679	58 56 48	2669	57 19 27	2660	55 41 53	2651
	Pollux	E.	60 39 49	2766	59 4 37	2760	57 29 16	2753	55 53 46	2747
	Regulus	E.	96 16 28	2677	94 39 17	2666	93 1 52	2657	91 24 14	2647
12	Fomalhaut	W.	90 50 2	2904	92 22 16	2896	93 54 41	2887	95 27 16	2880
	α Pegasi	W.	75 57 43	2912	77 29 46	2900	79 2 5	2887	80 34 40	2876
	α Arietis	W.	32 33 39	3096	34 1 51	3048	35 31 4	3004	37 1 12	2964
	Saturn	E.	47 30 57	2606	45 52 10	2597	44 13 11	2589	42 34 1	2582
	Pollux	E.	47 54 33	2796	46 18 28	2794	44 42 20	2793	43 6 11	2793
	Regulus	E.	83 12 50	2600	81 33 55	2591	79 54 48	2583	78 15 29	2574
13	Fomalhaut	W.	103 12 10	2855	104 45 27	2852	106 18 47	2850	107 52 10	2849
	α Pegasi	W.	88 21 1	2828	89 54 53	2819	91 28 56	2812	93 3 8	2806
	α Arietis	W.	44 43 0	2813	46 17 11	2790	47 51 52	2769	49 27 1	2749
	Saturn	E.	34 15 36	2545	32 35 26	2540	30 55 8	2535	29 14 43	2530
	Pollux	E.	35 6 10	2750	33 30 36	2761	31 55 17	2777	30 20 19	2797
	Regulus	E.	69 55 58	2533	68 15 30	2525	66 34 51	2517	64 54 1	2509
14	α Pegasi	W.	100 55 59	2782	102 30 50	2780	104 5 44	2778	105 40 41	2777
	α Arietis	W.	57 28 49	2667	59 6 13	2653	60 43 56	2640	62 21 56	2629
	Aldebaran	W.	23 40 45	2473	25 22 36	2467	27 4 36	2460	28 46 46	2453
	Regulus	E.	56 27 16	2473	54 45 25	2467	53 3 25	2460	51 21 16	2453
15	α Arietis	W.	70 35 44	2577	72 15 10	2569	73 54 48	2560	75 34 38	2552
	Aldebaran	W.	37 19 51	2422	39 2 54	2417	40 46 5	2410	42 29 25	2405
	Regulus	E.	42 48 15	2423	41 5 13	2417	39 22 3	2412	37 38 45	2406
	Spica	E.	96 28 33	2444	94 46 1	2438	93 3 21	2433	91 20 33	2427
	Sun	E.	127 51 54	2779	126 16 59	2772	124 41 55	2765	123 6 41	2758
16	α Arietis	W.	83 56 22	2518	85 37 10	2512	87 18 6	2507	88 59 9	2502
	Aldebaran	W.	51 8 2	2378	52 52 9	2373	54 36 23	2368	56 20 44	2363
	Regulus	E.	29 0 19	2380	27 16 16	2375	25 32 6	2371	23 47 49	2366
	Spica	E.	82 44 36	2401	81 1 2	2396	79 17 22	2391	77 33 35	2387
	Jupiter	E.	85 5 8	2446	83 22 39	2441	81 40 3	2436	79 57 20	2431
	Sun	E.	115 8 21	2726	113 32 16	2720	111 56 3	2714	110 19 42	2709
17	α Arietis	W.	97 26 3	2482	99 7 42	2478	100 49 26	2476	102 31 13	2474
	Aldebaran	W.	65 4 13	2339	66 49 15	2335	68 34 24	2331	70 19 39	2326
	Spica	E.	68 53 2	2366	67 8 38	2362	65 24 8	2358	63 39 33	2355
	Jupiter	E.	71 22 1	2406	69 38 37	2403	67 55 7	2399	66 11 31	2395
	Sun	E.	102 16 10	2683	100 39 7	2678	99 1 57	2672	97 24 40	2666

GREENWICH MEAN TIME.

LUNAR

AT GREENWICH APPARENT NOON.

Day of the Week.	Day of the Month.	THE SUN'S Apparent Right Ascension.	Diff. for 1 Hour.	Apparent Declination.	Diff. for 1 Hour.	Semi-diameter.	Sidereal Time of Semi-diameter Passing Meridian.	Equation of Time, to be Subtracted from / Added to Apparent Time.	Diff. for 1 Hour.
		h m s	s	° ′ ″	″	′ ″	s	m s	s
Wed.	1	16 30 17.71	10.806	S. 21 51 2.5	−23.11	16 15.97	70.32	10 44.27	0.948
Thur.	2	16 34 37.38	10.831	22 0 4.6	22.05	16 16.12	70.40	10 21.23	0.973
Frid.	3	16 38 57.64	10.856	22 8 41.1	20.99	16 16.27	70.48	9 57.59	0.997
Sat.	4	16 43 18.48	10.880	22 16 52.0	−19.91	16 16.41	70.56	9 33.37	1.021
SUN.	5	16 47 39.87	10.902	22 24 36.9	18.82	16 16.55	70.64	9 8.60	1.043
Mon.	6	16 52 1.78	10.923	22 31 55.5	17.72	16 16.68	70.71	8 43.31	1.064
Tues.	7	16 56 24.18	10.943	22 38 47.7	−16.61	16 16.81	70.78	8 17.54	1.084
Wed.	8	17 0 47.07	10.963	22 45 13.1	15.50	16 16.93	70.84	7 51.27	1.104
Thur.	9	17 5 10.42	10.981	22 51 11.7	14.38	16 17.05	70.90	7 24.56	1.122
Frid.	10	17 9 34.18	10.998	22 56 43.2	−13.25	16 17.17	70.96	6 57.43	1.139
Sat.	11	17 13 58.35	11.014	23 1 47.5	12.11	16 17.27	71.01	6 29.90	1.155
SUN.	12	17 18 22.90	11.029	23 6 24.3	10.96	16 17.37	71.06	6 1.98	1.170
Mon.	13	17 22 47.80	11.043	23 10 33.6	− 9.81	16 17.47	71.11	5 33 71	1.184
Tues.	14	17 27 13.02	11.056	23 14 15.2	8.66	16 17.56	71.15	5 5.12	1.197
Wed.	15	17 31 38 53	11.067	23 17 29.1	7.50	16 17.64	71.18	4 36.25	1.208
Thur.	16	17 36 4.31	11.078	23 20 15.0	− 6.33	16 17.72	71.21	4 7.11	1.219
Frid.	17	17 40 30.33	11.087	23 22 32.9	5.16	16 17.79	71.23	3 37.73	1.228
Sat.	18	17 44 56.54	11.096	23 24 22.7	3.98	16 17.86	71.25	3 8.15	1.236
SUN.	19	17 49 22.92	11.102	23 25 44.3	− 2.81	16 17.92	71.27	2 38.41	1.242
Mon.	20	17 53 49.43	11.107	23 26 37.6	1.63	16 17.98	71.28	2 8.54	1.247
Tues.	21	17 58 16.04	11.110	23 27 2.8	− 0.45	16 18.03	71.29	1 38.57	1.250
Wed.	22	18 2 42.71	11.112	23 26 59.7	+ 0.73	16 18.08	71.29	0 8.54	1.252
Thur.	23	18 7 9.40	11.112	23 26 28.2	1.91	16 18.13	71.29	0 38.49	1.252
Frid.	24	18 11 36.08	11.111	23 25 28.4	3.08	16 18.17	71.28	0 8.45	1.251
Sat.	25	18 16 2.70	11.108	23 24 0.4	+ 4.26	16 18.21	71.27	0 21.53	1.248
SUN.	26	18 20 29.24	11.103	23 22 4.2	5.43	16 18.24	71.26	0 51.43	1.243
Mon.	27	18 24 55.65	11.097	23 19 39.8	6.60	16 18.27	71.24	1 21.20	1.237
Tues.	28	18 29 21.88	11.089	23 16 47.2	+ 7.77	16 18.30	71.22	1 50.79	1.229
Wed.	29	18 33 47.90	11.080	23 13 26.6	8.93	16 18.32	71.19	2 20.17	1.220
Thur.	30	18 38 13.68	11.069	23 9 38.1	10.09	16 18.34	71.16	2 49.31	1.209
Frid.	31	18 42 39.17	11.057	23 5 21.8	11.25	16 18.35	71.12	3 18.17	1.196
Sat.	32	18 47 4.34	11.043	S. 23 0 37.7	+12.41	16 18.36	71.08	3 46.72	1.182

NOTE.—The mean time of semidiameter passing may be found by subtracting 0s.19 from the sidereal time.
The sign − prefixed to the hourly change of declination indicates that south declinations are increasing; the sign + indicates that south declinations are decreasing.

GREENWICH MEAN TIME.

THE MOON'S RIGHT ASCENSION AND DECLINATION.

WEDNESDAY 1.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
	h m s	s	° ′ ″	″
0	21 14 11.48	2.0222	S. 14 37 35.1	6.499
1	21 16 12.72	2.0190	14 31 3.3	6.560
2	21 18 13.76	2.0157	14 24 27.9	6.620
3	21 20 14.61	2.0126	14 17 48.9	6.679
4	21 22 15.27	2.0095	14 11 6.4	6.738
5	21 24 15.75	2.0064	14 4 20.3	6.797
6	21 26 16.04	2.0033	13 57 30.7	6.855
7	21 28 16.14	2.0002	13 50 37.7	6.912
8	21 30 16.06	1.9972	13 43 41.3	6.969
9	21 32 15.80	1.9941	13 36 41.4	7.026
10	21 34 15.35	1.9911	13 29 38.2	7.081
11	21 36 14.73	1.9882	13 22 31.7	7.136
12	21 38 13.93	1.9852	13 15 21.9	7.190
13	21 40 12.96	1.9823	13 8 8.9	7.243
14	21 42 11.81	1.9794	13 0 52.7	7.296
15	21 44 10.49	1.9766	12 53 33.3	7.349
16	21 46 9.00	1.9738	12 46 10.8	7.401
17	21 48 7.35	1.9711	12 38 45.2	7.452
18	21 50 5.53	1.9684	12 31 16.6	7.502
19	21 52 3.55	1.9657	12 23 45.0	7.553
20	21 54 1.41	1.9630	12 16 10.3	7.603
21	21 55 59.11	1.9603	12 8 32.6	7.652
22	21 57 56.65	1.9577	12 0 52.0	7.700
23	21 59 54.04	1.9552	S. 11 53 8.6	7.747

THURSDAY 2.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
0	22 1 51.27	1.9526	S. 11 45 22.3	7.795
1	22 3 48.35	1.9502	11 37 33.2	7.842
2	22 5 45.29	1.9478	11 29 41.3	7.888
3	22 7 42.08	1.9453	11 21 46.6	7.934
4	22 9 38.72	1.9429	11 13 49.2	7.979
5	22 11 35.23	1.9406	11 5 49.1	8.023
6	22 13 31.60	1.9383	10 57 46.4	8.067
7	22 15 27.83	1.9361	10 49 41.1	8.110
8	22 17 23.93	1.9338	10 41 33.2	8.153
9	22 19 19.89	1.9316	10 33 22.7	8.196
10	22 21 15.72	1.9295	10 25 9.7	8.238
11	22 23 11.43	1.9274	10 16 54.2	8.279
12	22 25 7.01	1.9253	10 8 36.2	8.320
13	22 27 2.47	1.9233	10 0 15.8	8.360
14	22 28 57.81	1.9213	9 51 53.0	8.399
15	22 30 53.03	1.9194	9 43 27.9	8.438
16	22 32 48.14	1.9176	9 35 0.4	8.476
17	22 34 43.14	1.9157	9 26 30.7	8.514
18	22 36 38.03	1.9139	9 17 58.7	8.552
19	22 38 32.81	1.9123	9 9 24.4	8.590
20	22 40 27.49	1.9104	9 0 47.9	8.626
21	22 42 22.06	1.9087	8 52 9.3	8.662
22	22 44 16.54	1.9071	8 43 28.5	8.697
23	22 46 10.92	1.9056	8 34 45.6	8.732
24	22 48 5.21	1.9041	S. 8 26 0.7	8.766

FRIDAY 3.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
	h m s	s	° ′ ″	″
0	22 48 5.21	1.9041	S. 8 26 0.7	8.766
1	22 49 59.41	1.9026	8 17 13.7	8.800
2	22 51 53.52	1.9011	8 8 24.7	8.833
3	22 53 47.54	1.8997	7 59 33.7	8.866
4	22 55 41.48	1.8984	7 50 40.8	8.899
5	22 57 35.34	1.8971	7 41 45.9	8.931
6	22 59 29.13	1.8958	7 32 49.1	8.962
7	23 1 22.84	1.8946	7 23 50.5	8.992
8	23 3 16.48	1.8934	7 14 50.1	9.022
9	23 5 10.05	1.8923	7 5 47.8	9.050
10	23 7 3.55	1.8912	6 56 43.8	9.082
11	23 8 56.99	1.8902	6 47 38.0	9.111
12	23 10 50.37	1.8892	6 38 30.5	9.138
13	23 12 43.69	1.8882	6 29 21.4	9.166
14	23 14 36.96	1.8874	6 20 10.6	9.193
15	23 16 30.18	1.8866	6 10 58.2	9.220
16	23 18 23.35	1.8858	6 1 44.2	9.246
17	23 20 16.48	1.8851	5 52 28.7	9.272
18	23 22 9.56	1.8844	5 43 11.6	9.298
19	23 24 2.60	1.8838	5 33 53.0	9.322
20	23 25 55.61	1.8832	5 24 33.0	9.345
21	23 27 48.58	1.8826	5 15 11.6	9.368
22	23 29 41.52	1.8821	5 5 48.8	9.392
23	23 31 34.44	1.8817	S. 4 56 24.6	9.415

SATURDAY 4.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
0	23 33 27.33	1.8813	S. 4 46 59.0	9.437
1	23 35 20.20	1.8810	4 37 32.1	9.458
2	23 37 13.05	1.8807	4 28 4.0	9.479
3	23 39 5.88	1.8804	4 18 34.6	9.500
4	23 40 58.70	1.8802	4 9 4.0	9.520
5	23 42 51.51	1.8801	3 59 32.2	9.540
6	23 44 44.31	1.8800	3 49 59.2	9.559
7	23 46 37.11	1.8800	3 40 25.1	9.577
8	23 48 29.91	1.8800	3 30 49.9	9.595
9	23 50 22.71	1.8801	3 21 13.7	9.613
10	23 52 15.52	1.8802	3 11 36.4	9.630
11	23 54 8.33	1.8803	3 1 58.1	9.646
12	23 56 1.15	1.8805	2 52 18.9	9.661
13	23 57 53.99	1.8808	2 42 38.8	9.677
14	23 59 46.85	1.8811	2 32 57.7	9.692
15	0 1 39.72	1.8814	2 23 15.7	9.707
16	0 3 32.62	1.8819	2 13 32.8	9.721
17	0 5 25.55	1.8824	2 3 49.2	9.734
18	0 7 18.51	1.8829	1 54 4.8	9.746
19	0 9 11.50	1.8835	1 44 19.7	9.759
20	0 11 4.53	1.8841	1 34 33.8	9.771
21	0 12 57.59	1.8848	1 24 47.2	9.782
22	0 14 50.70	1.8856	1 15 0.0	9.793
23	0 16 43.86	1.8863	1 5 12.1	9.803
24	0 18 37.06	1.8871	S. 0 55 23.6	9.812

GREENWICH MEAN TIME.

THE MOON'S RIGHT ASCENSION AND DECLINATION.

SUNDAY 5.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
	h m s	s	° ′ ″	″
0	0 18 37.06	1.8871	S. 0 55 23.6	9.819
1	0 20 30.31	1.8880	0 45 34.6	9.821
2	0 22 23.62	1.8890	0 35 45.1	9.830
3	0 24 16.99	1.8900	0 25 55.0	9.838
4	0 26 10.42	1.8910	0 16 4.5	9.845
5	0 28 3.91	1.8921	S. 0 6 13.6	9.852
6	0 29 57.47	1.8932	N. 0 3 37.7	9.858
7	0 31 51.10	1.8944	0 13 29.4	9.864
8	0 33 44.80	1.8957	0 23 21.4	9.869
9	0 35 38.58	1.8970	0 33 13.7	9.873
10	0 37 32.44	1.8983	0 43 6.2	9.877
11	0 39 26.38	1.8997	0 52 59.0	9.881
12	0 41 20.41	1.9012	1 2 52.0	9.884
13	0 43 14.53	1.9027	1 12 45.1	9.886
14	0 45 8.74	1.9042	1 22 38.3	9.888
15	0 47 3.04	1.9058	1 32 31.7	9.890
16	0 48 57.44	1.9075	1 42 25.1	9.890
17	0 50 51.94	1.9092	1 52 18.5	9.889
18	0 52 46.55	1.9110	2 2 11.8	9.888
19	0 54 41.26	1.9128	2 12 5.1	9.887
20	0 56 36.09	1.9147	2 21 58.3	9.885
21	0 58 31.03	1.9166	2 31 51.3	9.882
22	1 0 26.08	1.9185	2 41 44.1	9.879
23	1 2 21.25	1.9206	N. 2 51 36.8	9.876

MONDAY 6.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
0	1 4 16.55	1.9227	N. 3 1 29.3	9.872
1	1 6 11.97	1.9248	3 11 21.5	9.867
2	1 8 7.52	1.9269	3 21 13.3	9.861
3	1 10 3.20	1.9292	3 31 4.8	9.855
4	1 11 59.02	1.9315	3 40 55.9	9.847
5	1 13 54.98	1.9338	3 50 46.5	9.839
6	1 15 51.07	1.9361	4 0 36.6	9.831
7	1 17 47.31	1.9386	4 10 26.2	9.822
8	1 19 43.70	1.9410	4 20 15.3	9.813
9	1 21 40.23	1.9435	4 30 3.8	9.803
10	1 23 36.92	1.9461	4 39 51.7	9.792
11	1 25 33.76	1.9487	4 49 38.8	9.779
12	1 27 30.76	1.9514	4 59 25.2	9.767
13	1 29 27.92	1.9541	5 9 10.8	9.754
14	1 31 25.25	1.9569	5 18 55.7	9.741
15	1 33 22.74	1.9597	5 28 39.8	9.727
16	1 35 20.41	1.9626	5 38 23.0	9.712
17	1 37 18.25	1.9654	5 48 5.2	9.695
18	1 39 16.26	1.9683	5 57 46.4	9.678
19	1 41 14.45	1.9714	6 7 26.6	9.661
20	1 43 12.83	1.9745	6 17 5.7	9.643
21	1 45 11.39	1.9775	6 26 43.8	9.625
22	1 47 10.13	1.9806	6 36 20.7	9.605
23	1 49 9.06	1.9838	6 45 56.4	9.585
24	1 51 8.19	1.9871	N. 6 55 30.9	9.564

TUESDAY 7.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
	h m s	s	° ′ ″	″
0	1 51 8.19	1.9871	N. 6 55 30.9	9.564
1	1 53 7.51	1.9903	7 5 4.1	9.542
2	1 55 7.03	1.9937	7 14 36.0	9.520
3	1 57 6.75	1.9970	7 24 6.5	9.496
4	1 59 6.67	2.0004	7 33 35.5	9.472
5	2 1 6.80	2.0038	7 43 3.1	9.447
6	2 3 7.13	2.0072	7 52 29.2	9.422
7	2 5 7.67	2.0108	8 1 53.7	9.395
8	2 7 8.43	2.0145	8 11 16.6	9.367
9	2 9 9.41	2.0181	8 20 37.8	9.339
10	2 11 10.60	2.0217	8 29 57.3	9.310
11	2 13 12.01	2.0254	8 39 15.0	9.281
12	2 15 13.65	2.0292	8 48 31.0	9.251
13	2 17 15.51	2.0329	8 57 45.1	9.219
14	2 19 17.60	2.0367	9 6 57.3	9.187
15	2 21 19.92	2.0406	9 16 7.5	9.154
16	2 23 22.47	2.0444	9 25 15.7	9.120
17	2 25 25.25	2.0483	9 34 21.8	9.085
18	2 27 28.27	2.0523	9 43 25.9	9.049
19	2 29 31.53	2.0563	9 52 27.7	9.013
20	2 31 35.03	2.0604	10 1 27.4	8.976
21	2 33 38.78	2.0645	10 10 24.8	8.937
22	2 35 42.77	2.0686	10 19 19.8	8.897
23	2 37 47.01	2.0727	N.10 28 12.5	8.857

WEDNESDAY 8.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
0	2 39 51.50	2.0769	N.10 37 2.7	8.816
1	2 41 56.24	2.0811	10 45 50.4	8.774
2	2 44 1.23	2.0853	10 54 35.6	8.732
3	2 46 6.48	2.0896	11 3 18.2	8.688
4	2 48 11.99	2.0939	11 11 58.1	8.643
5	2 50 17.75	2.0982	11 20 35.4	8.598
6	2 52 23.77	2.1026	11 29 9.9	8.552
7	2 54 30.06	2.1070	11 37 41.6	8.504
8	2 56 36.61	2.1113	11 46 10.4	8.456
9	2 58 43.42	2.1157	11 54 36.3	8.407
10	3 0 50.50	2.1202	12 2 59.2	8.356
11	3 2 57.85	2.1247	12 11 19.0	8.304
12	3 5 5.46	2.1292	12 19 35.7	8.252
13	3 7 13.35	2.1337	12 27 49.2	8.199
14	3 9 21.51	2.1382	12 35 59.5	8.145
15	3 11 29.94	2.1428	12 44 6.6	8.091
16	3 13 38.65	2.1474	12 52 10.4	8.035
17	3 15 47.63	2.1520	13 0 10.8	7.977
18	3 17 56.89	2.1566	13 8 7.7	7.919
19	3 20 6.43	2.1612	13 16 1.1	7.860
20	3 22 16.24	2.1658	13 23 50.9	7.800
21	3 24 26.33	2.1705	13 31 37.1	7.739
22	3 26 36.70	2.1752	13 39 19.6	7.677
23	3 28 47.35	2.1799	13 46 58.4	7.615
24	3 30 58.29	2.1846	N.13 54 33.4	7.551

GREENWICH MEAN TIME.

THE MOON'S RIGHT ASCENSION AND DECLINATION.

THURSDAY 9.

Hour.	Right Ascension. h m s	Diff. for 1 Minute. s	Declination. ° ′ ″	Diff. for 1 Minute. ″
0	3 30 58.29	2.1846	N.13 54 33.4	7.551
1	3 33 9.51	2.1893	14 2 4.5	7.486
2	3 35 21.01	2.1940	14 9 31.7	7.420
3	3 37 32.79	2.1987	14 16 54.9	7.352
4	3 39 44.85	2.2034	14 24 14.0	7.284
5	3 41 57.20	2.2082	14 31 29.0	7.216
6	3 44 9.83	2.2129	14 38 39.9	7.147
7	3 46 22.75	2.2176	14 45 46.6	7.075
8	3 48 35.95	2.2223	14 52 48.9	7.003
9	3 50 49.43	2.2271	14 59 46.9	6.930
10	3 53 3.20	2.2318	15 6 40.5	6.857
11	3 55 17.25	2.2365	15 13 29.7	6.782
12	3 57 31.58	2.2412	15 20 14.3	6.705
13	3 59 46.19	2.2459	15 26 54.3	6.628
14	4 2 1.09	2.2506	15 33 29.7	6.551
15	4 4 16.27	2.2553	15 40 0.4	6.472
16	4 6 31.73	2.2600	15 46 26.3	6.392
17	4 8 47.47	2.2647	15 52 47.4	6.310
18	4 11 3.50	2.2694	15 59 3.5	6.228
19	4 13 19.80	2.2740	16 5 14.7	6.145
20	4 15 36.38	2.2787	16 11 20.9	6.062
21	4 17 53.24	2.2833	16 17 22.1	5.977
22	4 20 10.37	2.2878	16 23 18.1	5.890
23	4 22 27.77	2.2923	N.16 29 8.9	5.803

FRIDAY 10.

Hour.	Right Ascension. h m s	Diff. for 1 Minute. s	Declination. ° ′ ″	Diff. for 1 Minute. ″
0	4 24 45.45	2.2969	N.16 34 54.5	5.716
1	4 27 3.40	2.3014	16 40 34.8	5.627
2	4 29 21.62	2.3059	16 46 9.7	5.537
3	4 31 40.11	2.3104	16 51 39.2	5.447
4	4 33 58.87	2.3148	16 57 3.3	5.355
5	4 36 17.89	2.3193	17 2 21.8	5.262
6	4 38 37.18	2.3237	17 7 34.7	5.168
7	4 40 56.73	2.3280	17 12 42.0	5.074
8	4 43 16.54	2.3323	17 17 43.6	4.978
9	4 45 36.61	2.3366	17 22 39.4	4.882
10	4 47 56.93	2.3408	17 27 29.4	4.784
11	4 50 17.51	2.3451	17 32 13.5	4.686
12	4 52 38.34	2.3492	17 36 51.8	4.588
13	4 54 59.42	2.3533	17 41 24.1	4.488
14	4 57 20.74	2.3574	17 45 50.3	4.388
15	4 59 42.31	2.3615	17 50 10.5	4.286
16	5 2 4.12	2.3654	17 54 24.6	4.182
17	5 4 26.16	2.3693	17 58 32.4	4.078
18	5 6 48.44	2.3732	18 2 34.0	3.974
19	5 9 10.95	2.3771	18 6 29.3	3.869
20	5 11 33.69	2.3809	18 10 18.3	3.764
21	5 13 56.66	2.3847	18 14 1.0	3.657
22	5 16 19.85	2.3883	18 17 37.2	3.549
23	5 18 43.26	2.3919	18 21 6.9	3.442
24	5 21 6.88	2.3955	N.18 24 30.2	3.333

SATURDAY 11.

Hour.	Right Ascension. h m s	Diff. for 1 Minute. s	Declination. ° ′ ″	Diff. for 1 Minute. ″
0	5 21 6.88	2.3955	N.18 24 30.2	3.333
1	5 23 30.72	2.3991	18 27 46.9	3.223
2	5 25 54.77	2.4025	18 30 57.0	3.112
3	5 28 19.02	2.4058	18 34 0.4	3.001
4	5 30 43.47	2.4092	18 36 57.1	2.889
5	5 33 8.12	2.4125	18 39 47.1	2.777
6	5 35 32.97	2.4157	18 42 30.4	2.665
7	5 37 58.01	2.4188	18 45 6.9	2.551
8	5 40 23.23	2.4218	18 47 36.5	2.436
9	5 42 48.63	2.4248	18 49 59.2	2.321
10	5 45 14.21	2.4278	18 52 15.0	2.205
11	5 47 39.96	2.4307	18 54 23.8	2.089
12	5 50 5.89	2.4336	18 56 25.7	1.972
13	5 52 31.98	2.4362	18 58 20.5	1.855
14	5 54 58.23	2.4388	19 0 8.3	1.737
15	5 57 24.64	2.4414	19 1 49.0	1.619
16	5 59 51.20	2.4438	19 3 22.6	1.500
17	6 2 17.90	2.4462	19 4 49.0	1.380
18	6 4 44.75	2.4486	19 6 8.2	1.260
19	6 7 11.74	2.4509	19 7 20.2	1.140
20	6 9 38.86	2.4531	19 8 25.0	1.020
21	6 12 6.11	2.4552	19 9 22.6	0.899
22	6 14 33.49	2.4572	19 10 12.9	0.777
23	6 17 0.98	2.4591	N.19 10 55.9	0.655

SUNDAY 12.

Hour.	Right Ascension. h m s	Diff. for 1 Minute. s	Declination. ° ′ ″	Diff. for 1 Minute. ″
0	6 19 28.58	2.4609	N.19 11 31.5	0.532
1	6 21 56.29	2.4627	19 11 59.8	0.410
2	6 24 24.11	2.4645	19 12 20.7	0.287
3	6 26 52.03	2.4661	19 12 34.3	0.165
4	6 29 20.04	2.4676	19 12 40.5	+ 0.042
5	6 31 48.14	2.4691	19 12 39.3	− 0.082
6	6 34 16.33	2.4705	19 12 30.7	0.206
7	6 36 44.60	2.4717	19 12 14.6	0.330
8	6 39 12.94	2.4729	19 11 51.1	0.453
9	6 41 41.35	2.4741	19 11 20.2	0.577
10	6 44 9.83	2.4751	19 10 41.8	0.702
11	6 46 38.36	2.4759	19 9 56.0	0.826
12	6 49 6.94	2.4768	19 9 2.7	0.951
13	6 51 35.57	2.4776	19 8 1.9	1.076
14	6 54 4.25	2.4783	19 6 53.6	1.200
15	6 56 32.97	2.4789	19 5 37.9	1.324
16	6 59 1.72	2.4794	19 4 14.7	1.449
17	7 1 30.50	2.4798	19 2 44.0	1.573
18	7 3 59.30	2.4802	19 1 5.9	1.697
19	7 6 28.12	2.4804	18 59 20.3	1.822
20	7 8 56.95	2.4806	18 57 27.2	1.947
21	7 11 25.79	2.4807	18 55 26.7	2.071
22	7 13 54.64	2.4807	18 53 18.7	2.195
23	7 16 23.48	2.4807	18 51 3.3	2.318
24	7 18 52.32	2.4806	N.18 48 40.5	2.442

GREENWICH MEAN TIME.

THE MOON'S RIGHT ASCENSION AND DECLINATION.

WEDNESDAY 29.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
	h m s	s	° ′ ″	″
0	21 45 55.78	1.9904	S. 13 0 50.9	7.391
1	21 47 55.11	1.9873	12 53 25.9	7.443
2	21 49 54.26	1.9843	12 45 57.8	7.494
3	21 51 53.23	1.9813	12 38 26.6	7.546
4	21 53 52.02	1.9784	12 30 52.3	7.596
5	21 55 50.64	1.9755	12 23 15.1	7.645
6	21 57 49.08	1.9726	12 15 34.9	7.694
7	21 59 47.35	1.9697	12 7 51.8	7.743
8	22 1 45.44	1.9668	12 0 5.8	7.791
9	22 3 43.36	1.9640	11 52 16.9	7.838
10	22 5 41.12	1.9612	11 44 25.2	7.885
11	22 7 38.71	1.9584	11 36 30.7	7.931
12	22 9 36.13	1.9557	11 28 33.5	7.976
13	22 11 33.39	1.9530	11 20 33.6	8.021
14	22 13 30.49	1.9503	11 12 31.0	8.065
15	22 15 27.43	1.9477	11 4 25.8	8.108
16	22 17 24.22	1.9452	10 56 18.0	8.151
17	22 19 20.85	1.9426	10 48 7.7	8.193
18	22 21 17.33	1.9401	10 39 54.8	8.235
19	22 23 13.66	1.9376	10 31 39.5	8.276
20	22 25 9.84	1.9352	10 23 21.7	8.317
21	22 27 5.88	1.9327	10 15 1.5	8.357
22	22 29 1.77	1.9303	10 6 38.9	8.396
23	22 30 57.52	1.9280	S. 9 58 14.0	8.434

THURSDAY 30.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
0	22 32 53.13	1.9257	S. 9 49 46.8	8.472
1	22 34 48.60	1.9234	9 41 17.3	8.510
2	22 36 43.94	1.9212	9 32 45.6	8.547
3	22 38 39.15	1.9191	9 24 11.7	8.583
4	22 40 34.23	1.9169	9 15 35.6	8.619
5	22 42 29.18	1.9148	9 6 57.4	8.654
6	22 44 24.01	1.9127	8 58 17.1	8.689
7	22 46 18.71	1.9107	8 49 34.7	8.723
8	22 48 13.30	1.9088	8 40 50.3	8.756
9	22 50 7.77	1.9068	8 32 3.9	8.789
10	22 52 2.12	1.9049	8 23 15.6	8.822
11	22 53 56.36	1.9031	8 14 25.3	8.854
12	22 55 50.49	1.9013	8 5 33.1	8.885
13	22 57 44.51	1.8995	7 56 39.1	8.915
14	22 59 38.43	1.8978	7 47 43.3	8.946
15	23 1 32.25	1.8962	7 38 45.6	8.976
16	23 3 25.97	1.8945	7 29 46.2	9.004
17	23 5 19.59	1.8929	7 20 45.1	9.033
18	23 7 13.12	1.8914	7 11 42.3	9.061
19	23 9 6.56	1.8899	7 2 37.8	9.088
20	23 10 59.91	1.8884	6 53 31.7	9.115
21	23 12 53.17	1.8870	6 44 24.0	9.142
22	23 14 46.35	1.8857	6 35 14.7	9.167
23	23 16 39.45	1.8844	6 26 3.9	9.192
24	23 18 32.47	1.8831	S. 6 16 51.6	9.217

FRIDAY 31.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
	h m s	s	° ′ ″	″
0	23 18 32.47	1.8831	S. 6 16 51.6	9.217
1	23 20 25.42	1.8819	6 7 37.8	9.242
2	23 22 18.30	1.8808	5 58 22.6	9.265
3	23 24 11.11	1.8797	5 49 6.0	9.288
4	23 26 3.86	1.8786	5 39 48.0	9.311
5	23 27 56.54	1.8775	5 30 28.7	9.333
6	23 29 49.16	1.8766	5 21 8.0	9.356
7	23 31 41.73	1.8757	5 11 46.1	9.376
8	23 33 34.24	1.8748	5 2 22.9	9.397
9	23 35 26.70	1.8739	4 52 58.5	9.417
10	23 37 19.11	1.8732	4 43 32.9	9.436
11	23 39 11.48	1.8724	4 34 6.2	9.456
12	23 41 3.80	1.8717	4 24 38.3	9.474
13	23 42 56.08	1.8711	4 15 9.3	9.491
14	23 44 48.33	1.8706	4 5 39.3	9.508
15	23 46 40.55	1.8701	3 56 8.3	9.525
16	23 48 32.74	1.8696	3 46 36.3	9.542
17	23 50 24.90	1.8691	3 37 3.3	9.558
18	23 52 17.03	1.8687	3 27 29.3	9.574
19	23 54 9.14	1.8684	3 17 54.4	9.588
20	23 56 1.24	1.8682	3 8 18.7	9.602
21	23 57 53.32	1.8679	2 58 42.2	9.615
22	23 59 45.39	1.8678	2 49 4.9	9.629
23	0 1 37.45	1.8677	S. 2 39 26.7	9.643

SATURDAY, JANUARY 1, 1887.

Hour.	Right Ascension.	Diff. for 1 Minute.	Declination.	Diff. for 1 Minute.
0	0 3 29.51	1.8676	S. 2 29 47.7	9.656

PHASES OF THE MOON.

		d	h	m
☽ First Quarter	Dec.	3	2	25.0
○ Full Moon		10	21	30.2
☾ Last Quarter		17	18	39.1
● New Moon		24	21	54.7

		d	h
☾ Apogee	Dec.	3	2.9
☾ Perigee		15	12.0
☾ Apogee		31	0.2

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Name and Direction of Object.		Noon.	P. L. of Diff.	IIIh.	P. L. of Diff.	VIh.	P. L. of Diff.	IXh.	P. L. of Diff.
			° ′ ″		° ′ ″		° ′ ″		° ′ ″	
1	Sun	W.	67 14 23	3409	68 36 29	3417	69 58 26	3425	71 20 14	3433
	Mars	W.	34 22 37	3347	35 45 54	3351	37 9 6	3356	38 32 13	3361
	α Arietis	E.	79 30 27	3152	78 3 20	3161	76 36 24	3170	75 9 39	3179
	Aldebaran	E.	111 44 6	3006	110 14 1	3013	108 44 5	3020	107 14 17	3026
2	Sun	W.	78 7 25	3461	79 28 33	3464	80 49 37	3468	82 10 37	3471
	Mars	W.	45 26 34	3379	46 49 14	3382	48 11 51	3384	49 34 26	3386
	α Aquilæ	W.	39 34 42	4483	40 38 49	4402	41 44 8	4329	42 50 34	4261
	α Arietis	E.	67 58 28	3220	66 32 42	3228	65 7 6	3236	63 41 40	3244
	Aldebaran	E.	99 47 12	3054	98 18 6	3058	96 49 5	3061	95 20 8	3065
3	Sun	W.	88 54 55	3479	90 15 43	3480	91 36 30	3479	92 57 18	3478
	Mars	W.	56 26 56	3389	57 49 25	3388	59 11 55	3387	60 34 26	3386
	α Aquilæ	W.	48 36 47	4005	49 48 22	3964	51 0 37	3926	52 13 30	3892
	α Arietis	E.	56 36 38	3281	55 12 4	3288	53 47 38	3296	52 23 21	3304
	Aldebaran	E.	87 56 6	3072	86 27 22	3072	84 58 38	3071	83 29 53	3070
4	Sun	W.	99 41 48	3464	101 2 52	3461	102 24 0	3456	103 45 14	3450
	Mars	W.	67 27 42	3370	68 50 33	3365	70 13 29	3359	71 36 32	3354
	α Aquilæ	W.	58 26 3	3746	59 42 1	3723	60 58 24	3699	62 15 12	3677
	α Arietis	E.	45 24 30	3352	44 1 19	3365	42 38 22	3379	41 15 41	3393
	Aldebaran	E.	76 5 39	3058	74 36 38	3054	73 7 32	3050	71 38 21	3044
5	Sun	W.	110 33 3	3417	111 55 0	3409	113 17 6	3400	114 39 22	3392
	Mars	W.	78 33 31	3319	79 57 20	3311	81 21 19	3302	82 45 28	3294
	α Aquilæ	W.	68 44 55	3576	70 3 55	3558	71 23 15	3541	72 42 54	3523
	Fomalhaut	W.	35 52 52	3992	37 4 39	3919	38 17 40	3852	39 31 49	3791
	Aldebaran	E.	64 10 40	3014	62 40 44	3005	61 10 38	2997	59 40 22	2989
6	Sun	W.	121 33 20	3343	122 56 42	3332	124 20 17	3320	125 44 5	3309
	α Aquilæ	W.	79 25 49	3443	80 47 17	3429	82 9 1	3414	83 31 2	3400
	Fomalhaut	W.	45 57 7	3545	47 16 41	3506	48 36 59	3468	49 57 59	3432
	α Pegasi	W.	32 57 9	4140	34 6 32	4038	35 17 34	3946	36 30 7	3863
	Aldebaran	E.	52 6 16	2942	50 34 50	2931	49 3 10	2920	47 31 17	2909
	Saturn	E.	95 34 31	2927	94 2 47	2916	92 30 49	2905	90 58 37	2894
	Pollux	E.	96 3 9	3006	94 33 4	2996	93 2 46	2985	91 32 15	2974
7	Fomalhaut	W.	56 52 24	3278	58 17 1	3252	59 42 9	3225	61 7 48	3200
	α Pegasi	W.	42 52 3	3541	44 11 42	3490	45 32 17	3443	46 53 45	3399
	Aldebaran	E.	39 48 7	2848	38 14 42	2836	36 41 1	2823	35 7 3	2810
	Saturn	E.	83 13 55	2835	81 40 12	2821	80 6 12	2809	78 31 56	2795
	Pollux	E.	83 55 59	2914	82 23 58	2902	80 51 42	2890	79 19 10	2876
8	Fomalhaut	W.	68 23 16	3086	69 51 43	3065	71 20 36	3045	72 49 53	3025
	α Pegasi	W.	53 52 46	3213	55 18 40	3182	56 45 11	3152	58 12 18	3123
	Saturn	E.	70 36 12	2729	69 0 10	2714	67 23 49	2701	65 47 10	2687
	Pollux	E.	71 32 27	2815	69 58 18	2802	68 23 53	2790	66 49 12	2777
	Regulus	E.	107 20 16	2742	105 44 32	2728	104 8 29	2714	102 32 8	2700
9	Fomalhaut	W.	80 22 14	2935	81 53 48	2919	83 25 43	2902	84 57 59	2887
	α Pegasi	W.	65 36 14	2995	67 6 33	2973	68 37 20	2951	70 8 34	2930
	α Arietis	W.	23 10 9	3688	24 27 9	3547	25 46 41	3429	27 8 25	3327

GREENWICH MEAN TIME.

LUNAR

GREENWICH MEAN TIME.

NOVEMBER.

Day of Month.	Apparent Right Ascension. Noon.	Var. of R. A. for 1 Hour Noon.	Apparent Declination Noon.	Var. of Decl. for 1 Hour. Noon.	Meridian Passage.
	h m s	s	° ′ ″	″	h m
1	17 13 55.64	+0.102	−24 8 0.1	− 9.04	2 31.1
2	17 17 10.36	0.122	24 11 41.7	8.98	2 30.4
3	17 20 25.56	0.140	24 15 8.4	8.30	2 29.7
4	17 23 41.20	0.161	24 18 19.0	7.67	2 29.0
5	17 26 57.27	0.179	24 21 16.1	7.03	2 28.3
6	17 30 13.76	+0.196	−24 23 57.2	− 6.39	2 27.7
7	17 33 30.65	0.212	24 26 22.0	5.74	2 27.0
8	17 36 47.91	0.228	24 28 32.9	5.09	2 26.4
9	17 40 5.55	0.243	24 30 27.3	4.44	2 25.7
10	17 43 23.55	0.257	24 32 6.0	3.79	2 25.1
11	17 46 41.88	+0.271	−24 33 28.8	− 3.12	2 24.4
12	17 50 0.53	0.284	24 34 35.8	2.46	2 23.8
13	17 53 19.48	0.296	24 35 26.7	1.79	2 23.2
14	17 56 38.74	0.308	24 36 1.6	1.12	2 22.6
15	17 59 58.27	0.318	24 36 20.4	− 0.44	2 21.9
16	18 3 18.07	+0.330	−24 36 23.0	+ 0.24	2 21.3
17	18 6 38.11	0.340	24 36 9.3	0.91	2 20.7
18	18 9 58.30	0.353	24 35 39.3	1.60	2 20.1
19	18 13 18.80	0.362	24 34 53.0	2.27	2 19.5
20	18 16 39.50	0.369	24 33 50.3	2.96	2 18.9
21	18 20 0.47	+0.375	−24 32 31.1	+ 3.64	2 18.3
22	18 23 21.52	0.380	24 30 55.5	4.32	2 17.7
23	18 26 42.72	0.388	24 29 3.5	5.00	2 17.1
24	18 30 4.04	0.391	24 26 54.9	5.69	2 16.6
25	18 33 25.48	0.395	24 24 29.9	6.38	2 16.0
26	18 36 47.01	+0.398	−24 21 48.3	+ 7.06	2 15.4
27	18 40 8.61	0.401	24 18 50.2	7.76	2 14.8
28	18 43 30.26	0.403	24 15 35.6	8.46	2 14.3
29	18 46 51.95	0.404	24 12 4.5	9.14	2 13.7
30	18 50 13.65	0.404	24 8 16.9	9.83	2 13.1
				.51	2 12.5
				.20	2 11.9

DECEMBER.

Day of Month.	Apparent Right Ascension. Noon.	Var. of R. A. for 1 Hour Noon.	Apparent Declination Noon.	Var. of Decl. for 1 Hour Noon.	Meridian Passage.
	h m s	s	° ′ ″	″	h m
1	18 53 35.34	+0.403	−24 4 12.8	+10.51	2 12.5
2	18 56 57.00	0.401	23 59 52.4	11.20	2 11.9
3	19 0 18.62	0.399	23 55 15.5	11.89	2 11.3
4	19 3 40.17	0.396	23 50 22.3	12.56	2 10.8
5	19 7 1.65	0.392	23 45 12.7	13.24	2 10.2
6	19 10 23.02	+0.386	−23 39 46.9	+13.90	2 9.6
7	19 13 44.28	0.383	23 34 4.9	14.56	2 9.0
8	19 17 5.41	0.377	23 28 6.7	15.22	2 8.4
9	19 20 26.40	0.371	23 21 52.4	15.88	2 7.8
10	19 23 47.23	0.364	23 15 22.1	16.49	2 7.2
11	19 27 7.88	+0.357	−23 8 35.9	+17.12	2 6.6
12	19 30 28.34	0.349	23 1 33.9	17.72	2 6.0
13	19 33 48.61	0.340	22 54 16.0	18.37	2 5.4
14	19 37 8.67	0.331	22 46 42.5	19.00	2 4.8
15	19 40 28.51	0.322	22 38 53.4	19.67	2 4.2
16	19 43 48.12	+0.312	−22 30 48.8	+20.34	2 3.6
17	19 47 7.46	0.302	22 22 28.8	21.15	2 2.9
18	19 50 26.56	0.291	22 13 53.6	21.70	2 2.3
19	19 53 45.41	0.279	22 5 3.3	22.41	2 1.7
20	19 57 3.96	0.267	21 55 57.9	23.03	2 1.0
21	20 0 22.23	+0.255	−21 46 37.7	+23.65	2 0.4
22	20 3 40.20	0.242	21 37 2.7	24.26	1 59.8
23	20 6 57.85	0.229	21 27 13.0	24.87	1 59.1
24	20 10 15.18	0.215	21 17 8.9	25.47	1 58.4
25	20 13 32.18	0.201	21 6 50.5	26.06	1 57.8
26	20 16 48.83	+0.187	−20 56 17.8	+26.65	1 57.1
27	20 20 5.12	0.172	20 45 31.1	27.23	1 56.4
28	20 23 21.04	0.156	20 34 30.6	27.81	1 55.7
29	20 26 36.80	0.140	20 23 16.4	28.38	1 55.1
30	20 29 51.75	0.124	20 11 48.6	28.95	1 54.4
31	20 33 6.51	+0.107	−20 0 7.5	+29.51	1 53.7
32	20 36 20.86	+0.090	−19 48 13.2	+30.06	1 53.0

Day of the Month	22d.	27th.	2d	7th	12th	17th	22d	27th	32d
Semidiameter	2.4	2.4	2.4	2.4	2.4	2.3	2.3	2.3	2.3
Hor. Parallax	4.2	4.2	4.2	4.2	4.1	4.1	4.1	4.0	4.0

The sign + prefixed to the hourly change of declination indicates that north declinations are increasing and south declinations are decreasing. The sign — indicates that north declinations are decreasing and south declinations increasing.

GREENWICH MEAN TIME.

JANUARY.

Day of Month.	Apparent Right Ascension. Noon.	Var. of R. A. for 1 Hour. Noon.	Apparent Declination. Noon.	Var. of Decl. for 1 Hour. Noon.	Meridian Passage.
	h m s	s	° ′ ″	″	h m
1	12 22 3.10	+0.555	−0 57 17.7	−2.86	17 35.1
2	12 22 16.09	0.528	0 58 24.1	2.68	17 31.4
3	12 22 28.43	0.500	0 59 26.3	2.50	17 27.6
4	12 22 40.10	0.472	1 0 24.2	2.32	17 23.9
5	12 22 51.11	0.445	1 1 17.7	2.14	17 20.2
6	12 23 1.44	+0.417	−1 2 6.8	−1.95	17 16.4
7	12 23 11.11	0.389	1 2 51.5	1.77	17 12.6
8	12 23 20.09	0.360	1 3 31.7	1.58	17 8.8
9	12 23 28.40	0.332	1 4 7.6	1.40	17 5.0
10	12 23 36.02	0.303	1 4 38.9	1.21	17 1.2
11	12 23 42.96	+0.275	−1 5 5.8	−1.03	16 57.3
12	12 23 49.21	0.246	1 5 28.2	0.84	16 53.5
13	12 23 54.76	0.217	1 5 46.2	0.65	16 49.7
14	12 23 59.63	0.188	1 5 59.6	0.47	16 45.8
15	12 24 3.81	0.160	1 6 8.6	0.28	16 41.9
16	12 24 7.29	+0.131	−1 6 13.1	−0.09	16 38.0
17	12 24 10.07	0.101	1 6 13.1	+0.09	16 34.1
18	12 24 12.16	0.072	1 6 8.6	0.28	16 30.2
19	12 24 13.55	0.043	1 5 59.6	0.47	16 26.3
20	12 24 14.23	+0.014	1 5 45.9	0.66	16 22.4
21	12 24 14.21	−0.016	−1 5 27.8	+0.85	16 18.4
22	12 24 13.48	0.045	1 5 5.2	1.04	16 14.5
23	12 24 12.05	0.074	1 4 38.0	1.22	16 10.5
24	12 24 9.92	0.103	1 4 6.3	1.41	16 6.5
25	12 24 7.09	0.133	1 3 30.2	1.60	16 2.6
26	12 24 3.55	−0.162	−1 2 49.6	+1.78	15 58.6
27	12 23 59.31	0.191	1 2 4.6	1.97	15 54.6
28	12 23 54.37	0.220	1 1 15.1	2.15	15 50.5
29	12 23 48.72	0.250	1 0 21.2	2.33	15 46.5
30	12 23 42.38	0.279	0 59 22.8	2.52	15 42.5
31	12 23 35.34	−0.308	−0 58 20.1	+2.71	15 38.4
32	12 23 27.60	−0.337	−0 57 12.9	+2.89	15 34.3

Day of the Month.	1st.	11th.	21st.	31st.
Polar Semidiameter . .	17.9	18.4	19.0	19.6
Horizontal Parallax . .	1.7	1.7	1.8	1.8

FEBRUARY.

Day of Month.	Apparent Right Ascension. Noon.	Var. of R. A. for 1 Hour. Noon.	Apparent Declination. Noon	Var. of Decl. for 1 Hour. Noon.	Meridian Passage.
	h m s	s	° ′ ″	″	h m
1	12 23 27.60	−0.337	−0 57 12.9	+2.89	15 34.3
2	12 23 19.17	0.365	0 56 1.5	3.07	15 30.2
3	12 23 10.06	0.394	0 54 45.7	3.25	15 26.2
4	12 23 0.26	0.422	0 53 25.6	3.42	15 22.1
5	12 22 49.78	0.450	0 52 1.3	3.60	15 18.0
6	12 22 38.64	−0.478	−0 50 32.8	+3.77	15 13.8
7	12 22 26.84	0.505	0 49 0.3	3.94	15 9.7
8	12 22 14.37	0.533	0 47 23.6	4.11	15 5.6
9	12 22 1.26	0.560	0 45 43.0	4.28	15 1.4
10	12 21 47.51	0.586	0 43 58.4	4.45	14 57.2
11	12 21 33.13	−0.612	−0 42 9.9	+4.61	14 53.1
12	12 21 18.13	0.638	0 40 17.6	4.76	14 48.9
13	12 21 2.51	0.663	0 38 21.5	4.92	14 44.7
14	12 20 46.29	0.688	0 36 21.7	5.07	14 40.5
15	12 20 29.48	0.713	0 34 18.2	5.22	14 36.3
16	12 20 12.08	−0.737	−0 32 11.2	+5.36	14 32.0
17	12 19 54.11	0.761	0 30 0.7	5.51	14 27.8
18	12 19 35.57	0.784	0 27 46.8	5.65	14 23.5
19	12 19 16.49	0.806	0 25 29.6	5.78	14 19.3
20	12 18 56.86	0.829	0 23 9.1	5.92	14 15.0
21	12 18 36.71	−0.851	−0 20 45.5	+6.05	14 10.8
22	12 18 16.04	0.872	0 18 18.9	6.17	14 6.5
23	12 17 54.86	0.893	0 15 49.3	6.29	14 2.2
24	12 17 33.19	0.913	0 13 16.8	6.41	13 57.9
25	12 17 11.04	0.933	0 10 41.4	6.53	13 53.6
26	12 16 48.42	−0.952	−0 8 3.3	+6.64	13 49.3
27	12 16 25.36	0.970	0 5 22.6	6.75	13 45.0
28	12 16 1.85	0.988	−0 2 39.5	6.85	13 40.6
29	12 15 37.92	1.005	+0 0 6.1	6.94	13 36.3
30	12 15 13.59	1.022	0 2 53.8	7.03	13 32.0
31	12 14 48.87	−1.037	+0 5 43.7	+7.12	13 27.6
32	12 14 23.79	−1.052	+0 8 35.7	+7.20	13 23.3

Day of the Month.	1st.	11th.	21st.	31st.
Polar Semidiameter . .	19.6	20.1	20.5	20.9
Horizontal Parallax . .	1.8	1.9	1.9	2.0

NOTE.—The sign + indicates north declinations; the sign — indicates south declinations.

GREENWICH MEAN TIME.

SEPTEMBER.						OCTOBER.					
Day of Month.	Apparent Right Ascension.	Var. of R. A. for 1 Hour.	Apparent Declination.	Var. of Decl. for 1 Hour.	Meridian Passage.	Day of Month.	Apparent Right Ascension.	Var. of R. A. for 1 Hour.	Apparent Declination.	Var. of Decl. for 1 Hour.	Meridian Passage.
	Noon.	Noon.	Noon.	Noon.			Noon.	Noon.	Noon.	Noon.	
	h m s	s	° ′ ″	″	h m		h m s	s	° ′ ″	″	h m
1	12 32 6.22	+1.843	−2 14 16.4	−12.08	1 49.6	1	12 55 17.88	+1.997	−4 43 28.2	−12.58	0 14.7
2	12 32 50.54	1.850	2 19 6.9	12.12	1 46.4	2	12 56 5.84	1.999	4 48 30.0	12.57	0 11.6
3	12 33 35.04	1.858	2 23 58.2	12.16	1 43.2	3	12 56 53.85	2.001	4 53 31.7	12.57	0 8.4
4	12 34 19.73	1.865	2 28 50.4	12.19	1 40.0	4	12 57 41.90	2.003	4 58 33.2	12.56	0 5.3
5	12 35 4.59	1.873	2 33 43.3	12.22	1 36.8	5	12 58 29.99	2.005	5 3 34.5	12.55	0 2.2 / 23 59.0
6	12 35 49.61	+1.880	−2 38 36.9	−12.25	1 33.6	6	12 59 18.13	+2.006	−5 8 35.6	−12.54	23 55.9
7	12 36 34.80	1.887	2 43 31.3	12.28	1 30.4	7	13 0 6.30	2.008	5 13 36.3	12.52	23 52.8
8	12 37 20.15	1.893	2 48 26.4	12.31	1 27.3	8	13 0 54.50	2.009	5 18 36.7	12.51	23 49.6
9	12 38 5.65	1.899	2 53 22.1	12.34	1 24.1	9	13 1 42.72	2.010	5 23 36.7	12.49	23 46.5
10	12 38 51.30	1.905	2 58 18.5	12.37	1 20.9	10	13 2 30.97	2.011	5 28 36.4	12.48	23 43.4
11	12 39 37.10	+1.911	−3 3 15.4	−12.39	1 17.7	11	13 3 19.24	+2.011	−5 33 35.7	−12.46	23 40.2
12	12 40 23.04	1.917	3 8 12.9	12.41	1 14.6	12	13 4 7.52	2.012	5 38 34.6	12.44	23 37.1
13	12 41 9.13	1.923	3 13 11.0	12.43	1 11.4	13	13 4 55.81	2.012	5 43 32.9	12.42	23 34.0
14	12 41 55.34	1.928	3 18 9.5	12.45	1 8.2	14	13 5 44.10	2.012	5 48 30.7	12.40	23 30.8
15	12 42 41.68	1.933	3 23 8.5	12.47	1 5.1	15	13 6 32.40	2.012	5 53 28.1	12.38	23 27.7
16	12 43 28.14	+1.939	−3 28 7.7	−12.49	1 1.9	16	13 7 20.70	+2.012	−5 58 24.8	−12.35	23 24.6
17	12 44 14.74	1.944	3 33 7.5	12.50	0 58.7	17	13 8 8.99	2.012	6 3 21.0	12.32	23 21.5
18	12 45 1.46	1.949	3 38 7.6	12.52	0 55.6	18	13 8 57.27	2.012	6 8 16.6	12.30	23 18.3
19	12 45 48.30	1.954	3 43 8.0	12.53	0 52.4	19	13 9 45.54	2.011	6 13 11.6	12.28	23 15.2
20	12 46 35.24	1.958	3 48 8.8	12.54	0 49.3	20	13 10 33.78	2.010	6 18 5.9	12.25	23 12.1
21	12 47 22.30	+1.963	−3 53 9.9	−12.55	0 46.1	21	13 11 22.00	+2.009	−6 22 59.5	−12.22	23 8.9
22	12 48 9.46	1.967	3 58 11.2	12.56	0 43.0	22	13 12 10.20	2.008	6 27 52.3	12.18	23 5.8
23	12 48 56.72	1.971	4 3 12.7	12.57	0 39.8	23	13 12 58.37	2.006	6 32 44.3	12.15	23 2.6
24	12 49 44.08	1.975	4 8 14.4	12.58	0 36.7	24	13 13 46.49	2.004	6 37 35.5	12.12	22 59.5
25	12 50 31.53	1.979	4 13 16.3	12.58	0 33.5	25	13 14 34.57	2.002	6 42 25.8	12.08	22 56.4
26	12 51 19.06	+1.982	−4 18 18.2	−12.58	0 30.4	26	13 15 22.61	+2.000	−6 47 15.2	−12.05	22 53.2
27	12 52 6.68	1.986	4 23 20.2	12.58	0 27.2	27	13 16 10.59	1.998	6 52 3.8	12.00	22 50.1
28	12 52 54.38	1.989	4 28 22.2	12.59	0 24.1	28	13 16 58.51	1.995	6 56 51.3	11.96	22 47.0
29	12 53 42.15	1.992	4 33 24.3	12.58	0 21.0	29	13 17 46.35	1.993	7 1 37.9	11.92	22 43.8
30	12 54 29.98	1.994	4 38 26.3	12.58	0 17.8	30	13 18 34.13	1.989	7 6 23.5	11.88	22 40.7
31	12 55 17.88	+1.997	−4 43 28.2	−12.58	0 14.7	31	13 19 21.84	+1.986	−7 11 8.1	−11.83	22 37.5
32	12 56 5.84	+1.999	−4 48 30.0	−12.57	0 11.6	32	13 20 9.45	+1.982	−7 15 51.5	−11.79	22 34.4

Day of the Month.	1st.	11th.	21st.	31st.	Day of the Month.	1st.	11th.	21st.	31st.
Polar Semidiameter . .	14.″9	14.″7	14.″6	14.″6	Polar Semidiameter . .	14.″6	14.″6	14.″6	14.″7
Horizontal Parallax . .	1.4	1.4	1.4	1.4	Horizontal Parallax . .	1.4	1.4	1.4	1.4

NOTE.—The sign + indicates north declinations; the sign — indicates south declinations.

GREENWICH MEAN TIME.

JANUARY.

Day of Month.	Apparent Right Ascension.	Var. of R. A. for 1 Hour.	Apparent Declination.	Var. of Decl. for 1 Hour.	Meridian Passage.
	Noon.	*Noon.*	*Noon.*	*Noon.*	
	h m s	s	° ′ ″	″	h m
1	6 19 9.48	−0.884	+22 32 7.0	+0.70	11 32.8
2	6 18 48.29	0.881	22 32 23.7	0.69	11 28.6
3	6 18 27.18	0.877	22 32 40.3	0.69	11 24.3
4	6 18 6.17	0.873	22 32 56.8	0.68	11 20.0
5	6 17 45.26	0.868	22 33 13.2	0.68	11 15.7
6	6 17 24.49	−0.863	+22 33 29.5	+0.68	11 11.4
7	6 17 3.85	0.857	22 33 45.7	0.67	11 7.2
8	6 16 43.36	0.850	22 34 1.7	0.67	11 2.9
9	6 16 23.03	0.843	22 34 17.6	0.66	10 58.6
10	6 16 2.87	0.836	22 34 33.4	0.66	10 54.4
11	6 15 42.90	−0.828	+22 34 49.1	+0.65	10 50.1
12	6 15 23.12	0.820	22 35 4.6	0.64	10 45.8
13	6 15 3.56	0.811	22 35 20.0	0.64	10 41.6
14	6 14 44.21	0.801	22 35 35.3	0.63	10 37.3
15	6 14 25.09	0.792	22 35 50.4	0.63	10 33.1
16	6 14 6.21	−0.781	+22 36 5.4	+0.62	10 28.9
17	6 13 47.58	0.771	22 36 20.3	0.62	10 24.6
18	6 13 29.21	0.760	22 36 35.0	0.61	10 20.4
19	6 13 11.11	0.748	22 36 49.6	0.61	10 16.2
20	6 12 53.29	0.736	22 37 4.1	0.60	10 11.9
21	6 12 35.76	−0.724	+22 37 18.4	+0.60	10 7.7
22	6 12 18.52	0.712	22 37 32.7	0.59	10 3.5
23	6 12 1.59	0.699	22 37 46.8	0.59	9 59.3
24	6 11 44.97	0.686	22 38 0.8	0.58	9 55.1
25	6 11 28.68	0.672	22 38 14.6	0.57	9 50.9
26	6 11 12.72	−0.658	+22 38 28.4	+0.57	9 46.7
27	6 10 57.10	0.644	22 38 42.0	0.56	9 42.5
28	6 10 41.83	0.629	22 38 55.5	0.56	9 38.3
29	6 10 26.92	0.614	22 39 8.8	0.55	9 34.2
30	6 10 12.37	0.598	22 39 22.0	0.55	9 30.0
31	6 9 58.20	−0.582	+22 39 35.2	+0.54	9 25.8
32	6 9 44.41	−0.566	+22 39 48.2	+0.54	9 21.7

Day of the Month.	1st.	11th.	21st.	31st.
Polar Semidiameter . .	9.″7	9.″7	9.″6	9.″5
Horizontal Parallax . .	1.1	1.1	1.1	1.1

FEBRUARY.

Day of Month.	Apparent Right Ascension.	Var. of R. A. for 1 Hour.	Apparent Declination.	Var. of Decl. for 1 Hour.	Meridian Passage.
	Noon.	*Noon.*	*Noon*	*Noon.*	
	h m s	s	° ′ ″	″	h m
1	6 9 44.41	−0.566	+22 39 48.2	+0.54	9 21.7
2	6 9 31.02	0.550	22 40 1.1	0.53	9 17.5
3	6 9 18.02	0.533	22 40 13.9	0.53	9 13.4
4	6 9 5.42	0.516	22 40 26.5	0.53	9 9.2
5	6 8 53.24	0.499	22 40 39.1	0.52	9 5.1
6	6 8 41.48	−0.481	+22 40 51.5	+0.52	9 1.0
7	6 8 30.14	0.463	22 41 3.9	0.51	8 56.9
8	6 8 19.23	0.445	22 41 16.1	0.51	8 52.7
9	6 8 8.76	0.427	22 41 28.3	0.50	8 48.6
10	6 7 58.73	0.409	22 41 40.4	0.50	8 44.5
11	6 7 49.14	−0.390	+22 41 52.4	+0.50	8 40.5
12	6 7 40.00	0.371	22 42 4.2	0.49	8 36.4
13	6 7 31.31	0.352	22 42 16.0	0.49	8 32.3
14	6 7 23.08	0.333	22 42 27.7	0.49	8 28.2
15	6 7 15.31	0.314	22 42 39.4	0.48	8 24.2
16	6 7 8.00	−0.295	+22 42 50.9	+0.48	8 20.1
17	6 7 1.16	0.275	22 43 2.4	0.48	8 16.1
18	6 6 54.79	0.256	22 43 13.9	0.47	8 12.1
19	6 6 48.88	0.236	22 43 25.2	0.47	8 8.0
20	6 6 43.45	0.217	22 43 36.5	0.47	8 4.0
21	6 6 38.49	−0.197	+22 43 47.7	+0.46	8 0.0
22	6 6 34.00	0.177	22 43 58.8	0.46	7 56.0
23	6 6 30.00	0.157	22 44 9.8	0.46	7 52.0
24	6 6 26.47	0.137	22 44 20.8	0.45	7 48.0
25	6 6 23.43	0.117	22 44 31.7	0.45	7 44.0
26	6 6 20.88	−0.096	+22 44 42.5	+0.45	7 40.1
27	6 6 18.81	0.076	22 44 53.2	0.44	7 36.1
28	6 6 17.22	0.056	22 45 3.8	0.44	7 32.1
29	6 6 16.13	0.035	22 45 14.3	0.44	7 28.2
30	6 6 15.53	−0.015	22 45 24.8	0.43	7 24.2
31	6 6 15.42	+0.005	+22 45 35.2	+0.43	7 20.3
32	6 6 15.79	+0.026	+22 45 45.5	+0.43	7 16.4

Day of the Month.	1st.	11th.	21st.	31st.
Polar Semidiameter . .	9.″5	9.″3	9.″2	9.″0
Horizontal Parallax . .	1.1	1.1	1.0	1.0

NOTE.—The sign + indicates north declinations; the sign — indicates south declinations.

GREENWICH MEAN TIME.

Day of Month.	MARCH. Apparent Right Ascension. Noon.	Var. of R. A. for 1 Hour. Noon.	Apparent Declination. Noon.	Var. of Decl. for 1 Hour. Noon.	Meridian Passage.	Day of Month.	APRIL. Apparent Right Ascension. Noon.	Var. of R. A. for 1 Hour. Noon.	Apparent Declination. Noon.	Var. of Decl. for 1 Hour. Noon.	Meridian Passage.
	h m s	s	° ′ ″	″	h m		h m s	s	° ′ ″	″	h m
1	6 6 16.13	−0.035	+22 45 14.3	+0.44	7 28.2	1	6 9 40.42	+0.570	+22 49 46.0	+0.26	5 29.8
2	6 6 15.53	−0.015	22 45 24.8	0.43	7 24.2	2	6 9 54.32	0.588	22 49 52.1	0.25	5 26.1
3	6 6 15.42	+0.005	22 45 35.2	0.43	7 20.3	3	6 10 8.64	0.606	22 49 58.1	0.24	5 22.4
4	6 6 15.79	0.026	22 45 45.5	0.43	7 16.4	4	6 10 23.39	0.623	22 50 3.8	0.23	5 18.7
5	6 6 16.66	0.046	22 45 55.7	0.42	7 12.5	5	6 10 38.56	0.641	22 50 9.3	0.22	5 15.0
6	6 6 18.02	+0.067	+22 46 5.8	+0.42	7 8.6	6	6 10 54.14	+0.658	+22 50 14.5	+0.21	5 11.3
7	6 6 19.87	0.087	22 46 15.8	0.42	7 4.7	7	6 11 10.13	0.675	22 50 19.5	0.20	5 7.7
8	6 6 22.21	0.108	22 46 25.7	0.41	7 0.8	8	6 11 26.52	0.691	22 50 24.2	0.19	5 4.0
9	6 6 25.05	0.128	22 46 35.6	0.41	6 56.9	9	6 11 43.32	0.708	22 50 28.7	0.18	5 0.3
10	6 6 28.37	0.148	22 46 45.3	0.40	6 53.0	10	6 12 0.51	0.724	22 50 32.9	0.17	4 56.7
11	6 6 32.18	+0.169	+22 46 54.9	+0.40	6 49.2	11	6 12 18.09	+0.741	+22 50 36.8	+0.16	4 53.1
12	6 6 36.47	0.189	22 47 4.5	0.39	6 45.3	12	6 12 36.05	0.757	22 50 40.5	0.14	4 49.4
13	6 6 41.25	0.209	22 47 13.9	0.39	6 41.5	13	6 12 54.41	0.772	22 50 43.8	0.13	4 45.8
14	6 6 46.50	0.229	22 47 23.2	0.39	6 37.6	14	6 13 13.13	0.788	22 50 46.9	0.12	4 42.2
15	6 6 52.24	0.249	22 47 32.4	0.38	6 33.8	15	6 13 32.23	0.803	22 50 49.6	0.11	4 38.6
16	6 6 58.45	+0.269	+22 47 41.5	+0.38	6 29.9	16	6 13 51.69	+0.819	+22 50 52.0	+0.09	4 35.0
17	6 7 5.13	0.289	22 47 50.4	0.37	6 26.1	17	6 14 11.51	0.834	22 50 54.0	0.08	4 31.4
18	6 7 12.28	0.308	22 47 59.2	0.37	6 22.3	18	6 14 31.70	0.848	22 50 55.8	0.07	4 27.8
19	6 7 19.90	0.327	22 48 7.9	0.36	6 18.5	19	6 14 52.23	0.863	22 50 57.2	0.05	4 24.2
20	6 7 27.99	0.347	22 48 16.5	0.35	6 14.7	20	6 15 13.12	0.877	22 50 58.2	0.04	4 20.6
21	6 7 36.54	+0.366	+22 48 24.9	+0.35	6 10.9	21	6 15 34.35	+0.892	+22 50 58.9	+0.02	4 17.0
22	6 7 45.55	0.385	22 48 33.1	0.34	6 7.2	22	6 15 55.92	0.906	22 50 59.3	+0.01	4 13.4
23	6 7 55.02	0.404	22 48 41.2	0.33	6 3.4	23	6 16 17.83	0.920	22 50 59.2	−0.01	4 9.9
24	6 8 4.95	0.423	22 48 49.2	0.33	5 59.6	24	6 16 40.06	0.933	22 50 58.8	0.02	4 6.3
25	6 8 15.33	0.442	22 48 56.9	0.32	5 55.9	25	6 17 2.63	0.947	22 50 58.0	0.04	4 2.7
26	6 8 26.16	+0.460	+22 49 4.5	+0.31	5 52.1	26	6 17 25.53	+0.960	+22 50 56.9	−0.06	3 59.2
27	6 8 37.43	0.479	22 49 11.9	0.30	5 48.4	27	6 17 48.74	0.973	22 50 55.3	0.08	3 55.7
28	6 8 49.15	0.498	22 49 19.1	0.30	5 44.6	28	6 18 12.26	0.987	22 50 53.3	0.09	3 52.1
29	6 9 1.31	0.516	22 49 26.1	0.29	5 40.9	29	6 18 36.10	1.000	22 50 50.8	0.11	3 48.6
30	6 9 13.91	0.534	22 49 32.9	0.28	5 37.2	30	6 19 0.25	1.012	22 50 48.0	0.13	3 45.0
31	6 9 26.95	+0.552	+22 49 39.6	+0.27	5 33.5	31	6 19 24.69	+1.025	+22 50 44.8	−0.14	3 41.5
32	6 9 40.42	+0.570	+22 49 46.0	+0.26	5 29.8	32	6 19 49.43	+1.037	+22 50 41.1	−0.16	3 38.0

Day of the Month.	1st.	11th.	21st.	31st.	Day of the Month.	1st.	11th.	21st.	31st.
Polar Semidiameter . .	″ 9.1	″ 8.9	″ 8.7	″ 8.6	Polar Semidiameter . .	″ 8.6	″ 8.4	″ 8.3	″ 8.1
Horizontal Parallax . .	1.0	1.0	1.0	1.0	Horizontal Parallax . .	1.0	1.0	0.9	0.9

The sign + prefixed to the hourly change of declination indicates that north declinations are increasing and south declinations are decreasing. The sign — indicates that north declinations are decreasing and south declinations increasing.

GREENWICH MEAN TIME.

MAY.

Day of Month.	Apparent Right Ascension. Noon.	Var. of R. A. for 1 Hour. Noon.	Apparent Declination. Noon.	Var. of Decl. for 1 Hour. Noon.	Meridian Passage.
	h m s	s	° ′ ″	″	h m
1	6 19 24.69	+1.025	+22 50 44.8	−0.14	3 41.5
2	6 19 49.43	1.037	22 50 41.1	0.16	3 38.0
3	6 20 14.47	1.049	22 50 37.0	0.18	3 34.5
4	6 20 39.79	1.061	22 50 32.4	0.20	3 31.0
5	6 21 5.39	1.072	22 50 27.4	0.22	3 27.5
6	6 21 31.27	+1.083	+22 50 22.0	−0.24	3 24.0
7	6 21 57.42	1.095	22 50 16.0	0.26	3 20.5
8	6 22 23.84	1.106	22 50 9.7	0.27	3 17.0
9	6 22 50.52	1.117	22 50 2.8	0.30	3 13.5
10	6 23 17.45	1.127	22 49 55.5	0.32	3 10.0
11	6 23 44.63	+1.138	+22 49 47.7	−0.34	3 6.5
12	6 24 12.06	1.148	22 49 39.4	0.36	3 3.0
13	6 24 39.72	1.157	22 49 30.6	0.38	2 59.6
14	6 25 7.61	1.167	22 49 21.3	0.40	2 56.1
15	6 25 35.74	1.177	22 49 11.5	0.42	2 52.6
16	6 26 4.10	+1.186	+22 49 1.2	−0.44	2 49.2
17	6 26 32.67	1.195	22 48 50.4	0.46	2 45.7
18	6 27 1.45	1.204	22 48 39.1	0.48	2 42.3
19	6 27 30.45	1.213	22 48 27.3	0.50	2 38.8
20	6 27 59.66	1.221	22 48 14.9	0.51	2 35.4
21	6 28 29.06	+1.229	+22 48 2.0	−0.53	2 31.9
22	6 28 58.67	1.237	22 47 48.5	0.55	2 28.5
23	6 29 28.46	1.245	22 47 34.5	0.57	2 25.0
24	6 29 58.45	1.253	22 47 20.0	0.59	2 21.6
25	6 30 28.62	1.261	22 47 5.1	0.62	2 18.2
26	6 30 58.97	+1.268	+22 46 49.4	−0.64	2 14.7
27	6 31 29.50	1.276	22 46 33.3	0.66	2 11.3
28	6 32 0.20	1.283	22 46 16.6	0.69	2 7.9
29	6 32 31.07	1.289	22 45 59.4	0.73	2 4.5
30	6 33 2.09	1.296	22 45 41.6	0.75	2 1.1
31	6 33 33.28	+1.303	+22 45 23.2	−0.78	1 57.6
32	6 34 4.62	+1.309	+22 45 4.3	−0.80	1 54.2

Day of the Month.	1st.	11th.	21st.	31st.
Polar Semidiameter . .	8.1″	8.0″	7.9″	7.9″
Horizontal Parallax . .	0.9	0.9	0.9	0.9

JUNE.

Day of Month.	Apparent Right Ascension. Noon.	Var. of R. A. for 1 Hour. Noon.	Apparent Declination. Noon.	Var. of Decl. for 1 Hour. Noon.	Meridian Passage.
	h m s	s	° ′ ″	″	h m
1	6 34 4.62	+1.309	+22 45 4.3	−0.80	1 54.2
2	6 34 36.10	1.315	22 44 44.9	0.82	1 50.8
3	6 35 7.72	1.320	22 44 24.9	0.85	1 47.4
4	6 35 39.49	1.326	22 44 4.3	0.87	1 44.0
5	6 36 11.38	1.331	22 43 43.1	0.89	1 40.6
6	6 36 43.39	+1.336	+22 43 21.4	−0.92	1 37.2
7	6 37 15.53	1.341	22 42 59.2	0.94	1 33.8
8	6 37 47.79	1.346	22 42 36.4	0.96	1 30.4
9	6 38 20.15	1.351	22 42 13.0	0.99	1 27.0
10	6 38 52.62	1.355	22 41 49.1	1.01	1 23.6
11	6 39 25.19	+1.359	+22 41 24.6	−1.03	1 20.2
12	6 39 57.86	1.363	22 40 59.5	1.05	1 16.8
13	6 40 30.62	1.367	22 40 33.9	1.08	1 13.5
14	6 41 3.46	1.370	22 40 7.8	1.10	1 10.1
15	6 41 36.38	1.374	22 39 41.1	1.12	1 6.7
16	6 42 9.39	+1.377	+22 39 13.8	−1.15	1 3.3
17	6 42 42.48	1.380	22 38 46.0	1.17	0 59.9
18	6 43 15.63	1.383	22 38 17.6	1.19	0 56.5
19	6 43 48.84	1.385	22 37 48.7	1.22	0 53.2
20	6 44 22.13	1.388	22 37 19.2	1.24	0 49.8
21	6 44 55.47	+1.390	+22 36 49.2	−1.26	0 46.4
22	6 45 28.85	1.392	22 36 18.6	1.28	0 43.0
23	6 46 2.29	1.394	22 35 47.5	1.31	0 39.6
24	6 46 35.78	1.396	22 35 15.9	1.33	0 36.3
25	6 47 9.31	1.398	22 34 43.7	1.35	0 32.9
26	6 47 42.87	+1.399	+22 34 11.1	−1.37	0 29.5
27	6 48 16.46	1.400	22 33 37.9	1.40	0 26.1
28	6 48 50.08	1.401	22 33 4.2	1.42	0 22.8
29	6 49 23.73	1.402	22 32 29.9	1.44	0 19.4
30	6 49 57.38	1.403	22 31 55.2	1.46	0 16.0
31	6 50 31.05	+1.403	+22 31 20.0	−1.48	0 12.6
32	6 51 4.73	+1.403	+22 30 44.3	−1.50	0 9.3

Day of the Month.	1st.	11th.	21st.	31st.
Polar Semidiameter . .	7.9″	7.9″	7.8″	7.8″
Horizontal Parallax . .	0.9	0.9	0.9	0.9

NOTE.—The sign + indicates north declinations; the sign — indicates south declinations.

GREENWICH MEAN TIME.

JULY.						AUGUST.					
Day of Month.	Apparent Right Ascension. Noon.	Var. of R. A. for 1 Hour. Noon.	Apparent Declination. Noon.	Var. of Decl. for 1 Hour. Noon.	Meridian Passage.	Day of Month.	Apparent Right Ascension. Noon.	Var. of R. A. for 1 Hour. Noon.	Apparent Declination. Noon.	Var. of Decl. for 1 Hour. Noon.	Meridian Passage.
	h m s	s	° ′ ″	″	h m		h m s	s	° ′ ″	″	h m
1	6 50 31.05	+1.403	+22 31 20.0	−1.48	0 12.6	1	7 7 35.38	+1.321	+22 9 40.0	−1.96	22 24.3
2	6 51 4.73	1.403	22 30 44.3	1.50	0 9.3	2	7 8 7.01	1.315	22 8 53.0	1.96	22 20.9
3	6 51 38.41	1.403	22 30 8.1	1.52	0 5.9	3	7 8 38.51	1.309	22 8 5.8	1.97	22 17.5
4	6 52 12.09	1.403	22 29 31.4	1.54	{ 0 2.5 { 23 59.1	4	7 9 9.86	1.303	22 7 18.4	1.98	22 14.1
5	6 52 45.75	1.403	22 28 54.2	1.56	23 55.8	5	7 9 41.06	1.297	22 6 30.8	1.98	22 10.7
6	6 53 19.41	+1.402	+22 28 16.6	−1.58	23 52.4	6	7 10 12.10	+1.290	+22 5 43.1	−1.99	22 7.3
7	6 53 53.05	1.401	22 27 38.5	1.60	23 49.0	7	7 10 42.99	1.284	22 4 55.3	2.00	22 3.8
8	6 54 26.66	1.400	22 27 0.0	1.61	23 45.6	8	7 11 13.71	1.277	22 4 7.3	2.00	22 0.4
9	6 55 0.24	1.399	22 26 21.0	1.63	23 42.3	9	7 11 44.27	1.269	22 3 19.3	2.01	21 57.0
10	6 55 33.80	1.397	22 25 41.5	1.65	23 38.9	10	7 12 14.65	1.262	22 2 31.1	2.01	21 53.5
11	6 56 7.32	+1.396	+22 25 1.6	−1.67	23 35.5	11	7 12 44.86	+1.255	+22 1 42.8	−2.01	21 50.1
12	6 56 40.79	1.394	22 24 21.3	1.69	23 32.1	12	7 13 14.89	1.247	22 0 54.5	2.01	21 46.7
13	6 57 14.22	1.392	22 23 40.6	1.71	23 28.8	13	7 13 44.73	1.239	22 0 6.1	2.02	21 43.2
14	6 57 47.61	1.390	22 22 59.5	1.72	23 25.4	14	7 14 14.39	1.232	21 59 17.7	2.02	21 39.8
15	6 58 20.94	1.388	22 22 17.9	1.74	23 22.0	15	7 14 43.85	1.224	21 58 29.3	2.02	21 36.3
16	6 58 54.21	+1.385	+22 21 36.0	−1.75	23 18.6	16	7 15 13.13	+1.215	+21 57 40.8	−2.02	21 32.9
17	6 59 27.42	1.383	22 20 53.7	1.77	23 15.2	17	7 15 42.19	1.207	21 56 52.4	2.02	21 29.4
18	7 0 0.57	1.380	22 20 11.1	1.79	23 11.8	18	7 16 11.06	1.198	21 56 4.0	2.02	21 26.0
19	7 0 33.65	1.377	22 19 28.0	1.80	23 8.5	19	7 16 39.72	1.190	21 55 15.6	2.02	21 22.5
20	7 1 6.66	1.374	22 18 44.6	1.82	23 5.1	20	7 17 8.16	1.181	21 54 27.2	2.01	21 19.1
21	7 1 39.58	+1.370	+22 18 0.9	−1.83	23 1.7	21	7 17 36.38	+1.171	+21 53 39.0	−2.01	21 15.6
22	7 2 12.43	1.367	22 17 16.8	1.84	22 58.3	22	7 18 4.38	1.162	21 52 50.8	2.00	21 12.1
23	7 2 45.19	1.363	22 16 32.4	1.86	22 54.9	23	7 18 32.16	1.153	21 52 2.7	2.00	21 8.7
24	7 3 17.86	1.359	22 15 47.7	1.87	22 51.5	24	7 18 59.70	1.143	21 51 14.8	1.99	21 5.2
25	7 3 50.44	1.355	22 15 2.6	1.89	22 48.1	25	7 19 27.00	1.132	21 50 27.0	1.99	21 1.7
26	7 4 22.91	+1.351	+22 14 17.3	−1.90	22 44.7	26	7 19 54.06	+1.122	+21 49 39.3	−1.98	20 58.2
27	7 4 55.28	1.346	22 13 31.7	1.91	22 41.3	27	7 20 20.88	1.112	21 48 51.8	1.97	20 54.7
28	7 5 27.54	1.346	22 12 45.8	1.92	22 37.9	28	7 20 47.44	1.101	21 48 4.5	1.96	20 51.2
29	7 5 59.68	1.337	22 11 59.7	1.93	22 34.5	29	7 21 13.74	1.090	21 47 17.5	1.96	20 47.7
30	7 6 31.71	1.332	22 11 13.4	1.94	22 31.1	30	7 21 39.78	1.079	21 46 30.6	1.95	20 44.2
31	7 7 3.61	+1.326	+22 10 26.8	−1.95	22 27.7	31	7 22 5.55	+1.068	+21 45 44.0	−1.94	20 40.7
32	7 7 35.38	+1.321	+22 9 40.0	−1.96	22 24.3	32	7 22 31.04	+1.057	+21 44 57.7	−1.92	20 37.2

Day of the Month.	1st.	11th.	21st.	31st.	Day of the Month.	1st.	11th.	21st.	31st.
Polar Semidiameter . .	7.8″	7.8″	7.8″	7.9″	Polar Semidiameter . .	7.9″	7.9″	8.0″	8.1″
Horizontal Parallax . .	0.9	0.9	0.9	0.9	Horizontal Parallax . .	0.9	0.9	0.9	0.9

The sign + prefixed to the hourly change of declination indicates that north declinations are increasing and south declinations are decreasing. The sign — indicates that north declinations are decreasing and south declinations increasing.

GREENWICH MEAN TIME.

SEPTEMBER.

Day of Month.	Apparent Right Ascension. Noon.	Var. of R. A. for 1 Hour. Noon.	Apparent Declination. Noon.	Var. of Decl. for 1 Hour. Noon.	Meridian Passage.
	h m s	s	° ′ ″	″	h m
1	7 22 31.04	+1.057	+21 44 57.7	−1.92	20 37.2
2	7 22 56.26	1.045	21 44 11.6	1.91	20 33.7
3	7 23 21.19	1.033	21 43 25.9	1.90	20 30.2
4	7 23 45.84	1.021	21 42 40.4	1.89	20 26.6
5	7 24 10.20	1.009	21 41 55.3	1.87	20 23.1
6	7 24 34.26	+0.996	+21 41 10.6	−1.86	20 19.6
7	7 24 58.02	0.984	21 40 26.2	1.84	20 16.0
8	7 25 21.48	0.971	21 39 42.2	1.83	20 12.5
9	7 25 44.64	0.958	21 38 58.6	1.81	20 8.9
10	7 26 7.48	0.945	21 38 15.4	1.79	20 5.4
11	7 26 30.01	+0.932	+21 37 32.6	−1.77	20 1.8
12	7 26 52.22	0.919	21 36 50.3	1.75	19 58.2
13	7 27 14.10	0.905	21 36 8.5	1.73	19 54.6
14	7 27 35.66	0.891	21 35 27.2	1.71	19 51.1
15	7 27 56.88	0.877	21 34 46.4	1.69	19 47.5
16	7 28 17.77	+0.863	+21 34 6.1	−1.67	19 43.9
17	7 28 38.32	0.849	21 33 26.4	1.64	19 40.3
18	7 28 58.53	0.834	21 32 47.2	1.62	19 36.7
19	7 29 18.38	0.820	21 32 8.7	1.59	19 33.1
20	7 29 37.88	0.805	21 31 30.7	1.57	19 29.5
21	7 29 57.03	+0.790	+21 30 53.3	−1.54	19 25.9
22	7 30 15.81	0.775	21 30 16.6	1.52	19 22.2
23	7 30 34.22	0.759	21 29 40.6	1.49	19 18.6
24	7 30 52.26	0.744	21 29 5.2	1.46	19 15.0
25	7 31 9.93	0.728	21 28 30.5	1.43	19 11.3
26	7 31 27.21	+0.712	+21 27 56.5	−1.40	19 7.7
27	7 31 44.10	0.696	21 27 23.3	1.37	19 4.0
28	7 32 0.60	0.680	21 26 50.7	1.34	19 0.3
29	7 32 16.71	0.663	21 26 19.0	1.31	18 56.7
30	7 32 32.42	0.646	21 25 48.1	1.27	18 53.0
31	7 32 47.73	+0.629	+21 25 18.0	−1.24	18 49.3
32	7 33 2.63	+0.612	+21 24 48.6	−1.20	18 45.6

Day of the Month.	1st.	11th.	21st.	31st.
Polar Semidiameter . .	8.″1	8.″2	8.″3	8.″5
Horizontal Parallax . .	0.9	0.9	0.9	1.0

OCTOBER.

Day of Month.	Apparent Right Ascension. Noon.	Var. of R. A. for 1 Hour. Noon.	Apparent Declination. Noon.	Var. of Decl. for 1 Hour. Noon.	Meridian Passage.
	h m s	s	° ′ ″	″	h m
1	7 32 47.73	+0.629	+21 25 18.0	−1.24	18 49.3
2	7 33 2.63	0.612	21 24 48.6	1.20	18 45.6
3	7 33 17.13	0.595	21 24 20.1	1.17	18 41.9
4	7 33 31.20	0.578	21 23 52.5	1.13	18 38.2
5	7 33 44.87	0.561	21 23 25.7	1.10	18 34.5
6	7 33 58.11	+0.543	+21 22 59.7	−1.06	18 30.8
7	7 34 10.94	0.525	21 22 34.7	1.02	18 27.1
8	7 34 23.34	0.508	21 22 10.6	0.99	18 23.3
9	7 34 35.31	0.490	21 21 47.3	0.95	18 19.6
10	7 34 46.85	0.472	21 21 25.1	0.91	18 15.8
11	7 34 57.96	+0.454	+21 21 3.6	−0.87	18 12.0
12	7 35 8.63	0.436	21 20 43.2	0.83	18 8.3
13	7 35 18.86	0.417	21 20 23.8	0.79	18 4.6
14	7 35 28.65	0.399	21 20 5.3	0.75	18 0.8
15	7 35 38.00	0.380	21 19 47.8	0.71	17 57.0
16	7 35 46.90	+0.361	+21 19 31.4	−0.66	17 53.2
17	7 35 55.35	0.342	21 19 16.0	0.62	17 49.4
18	7 36 3.35	0.324	21 19 1.6	0.58	17 45.6
19	7 36 10.90	0.305	21 18 48.2	0.53	17 41.8
20	7 36 17.98	0.285	21 18 35.9	0.49	17 38.0
21	7 36 24.60	+0.266	+21 18 24.6	−0.45	17 34.2
22	7 36 30.76	0.246	21 18 14.4	0.40	17 30.3
23	7 36 36.44	0.227	21 18 5.3	0.36	17 26.5
24	7 36 41.66	0.208	21 17 57.3	0.31	17 22.6
25	7 36 46.41	0.188	21 17 50.4	0.27	17 18.8
26	7 36 50.69	+0.168	+21 17 44.6	−0.22	17 14.9
27	7 36 54.49	0.148	21 17 39.9	0.17	17 11.0
28	7 36 57.81	0.129	21 17 36.3	0.13	17 7.2
29	7 37 0.66	0.109	21 17 33.8	0.08	17 3.3
30	7 37 3.04	0.089	21 17 32.5	−0.03	16 59.4
31	7 37 4.93	+0.069	+21 17 32.3	+0.01	16 55.5
32	7 37 6.34	+0.049	+21 17 33.2	+0.06	16 51.6

Day of the Month.	1st.	11th.	21st.	31st.
Polar Semidiameter . .	8.″5	8.″6	8.″8	9.″0
Horizontal Parallax . .	1.0	1.0	1.0	1.0

NOTE.—The sign + indicates north declinations; the sign − indicates south declinations.

Greatest horizontal parallax,	March 26, 0''.51.	Greatest semidiameter,	March [illegible], 1''.[illegible]
Least horizontal parallax,	September 30, 0''.46.	Least semidiameter,	September [illegible], 1''.[illegible]

Least horizontal parallax, May 17 [illegible] Least semidiameter, May 17, [illegible]

MARS.

GREENWICH MEAN NOON.

Date.	Heliocentric Longitude, Mean Equinox of Date.	Daily Motion.	Reduction to Orbit	Heliocentric Latitude.	Daily Motion.	Logarithm of Radius Vector.	Logarithm of Distance from Earth— At Date.	Logarithm of Distance from Earth— At Intermediate Date.
	° ′ ″	′ ″	″	° ′ ″	″			
uly 2	220 2 6.6	29 28.58	−16.0	+0 16 41.0	−56.47	0.1958828	0.1420270	0.1464702
6	222 0 22.4	29 39.41	12.4	0 12 53.8	57.09	0.1945510	0.1508317	0.1551116
10	223 59 22.3	29 50.55	8.8	0 9 4.3	57.64	0.1931963	0.1593113	0.1634321
14	225 59 7.2	30 1.90	5.0	0 5 12.7	58.14	0.1918198	0.1674961	0.1714453
18	227 59 37.9	30 13.50	− 1.3	+0 1 19.2	58.58	0.1904233	0.1753420	0.1791665
22	230 0 55.6	30 25.39	+ 2.5	−0 2 35.9	−58.94	0.1890079	0.1829223	0.1866094
26	232 3 1.3	30 37.45	6.3	0 6 32.3	59.25	0.1875753	0.1902292	0.1937828
30	234 5 55.5	30 49.74	10.2	0 10 29.9	59.49	0.1861273	0.1972707	0.2006927
ug. 3	236 9 39.5	31 2.26	13.9	0 14 28.2	59.63	0.1846651	0.2040498	0.2073427
7	238 14 13.9	31 14.94	17.6	0 18 26.9	59.71	0.1831907	0.2105719	0.2137397
11	240 19 39.3	31 27.81	+21.3	−0 22 25.9	−59.72	0.1817058	0.2168472	0.2198960
15	242 25 56.7	31 40.86	24.9	0 26 24.7	59.63	0.1802123	0.2228877	0.2258244
19	244 33 6.5	31 54.10	28.4	0 30 22.9	59.45	0.1787121	0.2287077	0.2315380
23	246 41 9.7	32 7.50	31.7	0 34 20.3	59.20	0.1772073	0.2343171	0.2370452
27	248 50 6.7	32 20.94	34.8	0 38 16.5	58.83	0.1756998	0.2397231	0.2423512
31	250 59 57.5	32 34.50	+37.9	−0 42 11.0	−58.38	0.1741919	0.2449299	0.2474592
ept. 4	253 10 42.9	32 48.18	40.7	0 46 3.5	57.84	0.1726859	0.2499406	0.2523746
8	255 22 23.0	33 1.88	43.3	0 49 53.7	57.17	0.1711837	0.2547628	0.2571065
12	257 34 58.0	33 15.65	45.7	0 53 40.9	56.40	0.1696881	0.2594070	0.2616659
16	259 48 28.2	33 29.44	47.7	0 57 24.9	55.54	0.1682010	0.2638848	0.2660649
20	262 2 53.5	33 43.21	+49.5	−1 1 5.2	−54.54	0.1667253	0.2682065	0.2703105
24	264 18 13.9	33 56.97	51.0	1 4 41.3	53.44	0.1652632	0.2723779	0.2744083
28	266 34 29.2	34 10.65	52.3	1 8 12.8	52.24	0.1638177	0.2764023	0.2783604
ct. 2	268 51 39.0	34 24.24	53.2	1 11 39.2	50.91	0.1623912	0.2802826	0.2821703
6	271 9 43.0	34 37.74	53.7	1 15 0.1	49.45	0.1609865	0.2840241	0.2858450
10	273 28 40.7	34 51.07	+53.9	−1 18 14.8	−47.89	0.1596059	0.2876346	0.2893942
14	275 48 31.4	35 4.20	53.8	1 21 23.2	46.21	0.1582523	0.2911251	0.2928296
18	278 9 14.1	35 17.12	53.3	1 24 24.5	44.39	0.1569283	0.2945043	0.2961541
22	280 30 48.2	35 29.90	52.4	1 27 18.3	42.47	0.1556370	0.2977783	0.2993765
26	282 53 13.0	35 42.34	51.0	1 30 4.3	40.42	0.1543809	0.3009493	0.3024972
30	285 16 26.6	35 54.46	+49.5	−1 32 41.7	−38.26	0.1531626	0.3040201	0.3055181
ov. 3	287 40 28.3	36 6.29	47.6	1 35 10.4	36.00	0.1519850	0.3069925	0.3084444
7	290 5 16.4	36 17.71	45.4	1 37 29.7	33.61	0.1508506	0.3098739	0.3112829
11	292 30 49.5	36 28.75	42.7	1 39 39.2	31.13	0.1497620	0.3126728	0.3140439
15	294 57 5.8	36 39.31	39.7	1 41 38.7	28.57	0.1487217	0.3153972	0.3167336
19	297 24 3.4	36 49.41	+36.5	−1 43 27.8	−25.89	0.1477324	0.3180541	0.3193563
23	299 51 40.5	36 59.06	32.9	1 45 5.8	23.09	0.1467965	0.3206423	0.3219124
27	302 19 55.2	37 8.12	29.1	1 46 32.5	20.22	0.1459160	0.3231659	0.3244031
ec. 1	304 48 44.8	37 16.60	25.1	1 47 47.6	17.29	0.1450936	0.3256237	0.3268306
5	307 18 7.2	37 24.51	20.8	1 48 50.8	14.27	0.1443312	0.3280229	0.3292015
9	309 48 0.1	37 31.81	+16.4	−1 49 41.8	−11.20	0.1436307	0.3303679	0.3315224
13	312 18 20.8	37 38.42	11.9	1 50 20.4	8.07	0.1429940	0.3326660	0.3337994
17	314 49 6.6	37 44.35	7.2	1 50 46.4	4.91	0.1424230	0.3349225	0.3360358
21	317 20 14.7	37 49.64	+ 2.5	1 50 59.7	− 1.71	0.1419189	0.3371390	0.3382317
25	319 51 42.8	37 54.24	− 2.2	1 51 0.1	+ 1.51	0.1414832	0.3393140	0.3403860
29	322 23 27.6	37 58.05	− 6.9	−1 50 47.6	+ 4.76	0.1411171	0.3414474	0.3424990
33	324 55 26.2	38 1.14	−11.6	−1 50 22.0	+ 8.01	0.1408215	0.3435411	0.3445742

[illegible]	56	40	6.0	22.01
27	56	43	9.1	22.01

FOR GREENWICH MEAN NOON AND MIDNIGHT.

Date.		X True Equinox.		Reduc. to Mean Eq'x of Jan. 0.	Y True Equinox.		Reduc. to Mean Eq'x of Jan. 0.	Z True Equinox.		Reduc. to Mean Eq'x of Jan. 0.
		Noon.	*Midnight.*	*Noon.*	*Noon.*	*Midnight.*	*Noon.*	*Noon.*	*Midnight.*	*Noon.*
Jan.	0	+0.1715669	+0.1801745	+126	−0.8882228	−0.8867886	+201	−0.3853137	−0.3846913	−407
	1	0.1887685	0.1973481	118	0.8852850	0.8837122	201	0.3840389	0.3833565	406
	2	0.2059126	0.2144612	109	0.8820702	0.8803592	201	0.3826441	0.3819019	404
	3	0.2229932	0.2315079	101	0.8785793	0.8767307	201	0.3811297	0.3803279	402
	4	0.2400045	0.2484826	93	0.8748134	0.8728278	200	0.3794963	0.3786351	400
	5	+0.2569412	+0.2653799	+ 85	−0.8707737	−0.8686517	+199	−0.3777443	−0.3768240	−398
	6	0.2737977	0.2821941	77	0.8664616	0.8642039	197	0.3758742	0.3748951	396
	7	0.2905682	0.2989194	69	0.8618786	0.8594860	195	0.3738865	0.3728490	394
	8	0.3072468	0.3155501	62	0.8570262	0.8544996	193	0.3717821	0.3706864	392
	9	0.3238282	0.3320810	54	0.8519062	0.8492465	191	0.3695617	0.3684083	390
	10	+0.3403075	+0.3485072	+ 47	−0.8465204	−0.8437287	+188	−0.3672262	−0.3660155	−388
	11	0.3566795	0.3648236	40	0.8408711	0.8379484	185	0.3647763	0.3635087	386
	12	0.3729390	0.3810249	33	0.8349605	0.8319079	181	0.3622129	0.3608889	383
	13	0.3890808	0.3971060	26	0.8287907	0.8256093	177	0.3595370	0.3581571	381
	14	0.4050999	0.4130622	20	0.8223639	0.8190549	173	0.3567496	0.3553143	378
	15	+0.4209920	+0.4288891	+ 13	−0.8156824	−0.8122470	+169	−0.3538515	−0.3523614	−375
	16	0.4367526	0.4445821	7	0.8087487	0.8051882	165	0.3508439	0.3492994	372
	17	0.4523770	0.4601367	+ 1	0.8015654	0.7978809	161	0.3477279	0.3461295	370
	18	0.4678605	0.4755481	− 5	0.7941347	0.7903273	156	0.3445044	0.3428526	367
	19	0.4831986	0.4908120	11	0.7864589	0.7825297	151	0.3411743	0.3394696	364
	20	+0.4983875	+0.5059243	− 17	−0.7785401	−0.7744904	+146	−0.3377386	−0.3359816	−361
	21	0.5134222	0.5208807	23	0.7703807	0.7662115	141	0.3341986	0.3323898	358
	22	0.5282992	0.5356770	28	0.7619834	0.7576965	135	0.3305553	0.3286953	355
	23	0.5430137	0.5503087	33	0.7533507	0.7489467	129	0.3268099	0.3248992	352
	24	0.5575613	0.5647713	38	0.7444848	0.7399653	123	0.3229633	0.3210024	349
	25	+0.5719378	+0.5790605	− 43	−0.7353881	−0.7307541	+117	−0.3190164	−0.3170059	−346
	26	0.5861387	0.5931718	47	0.7260631	0.7213159	110	0.3149705	0.3129110	343
	27	0.6001593	0.6071006	52	0.7165125	0.7116535	104	0.3108270	0.3087190	340
	28	0.6139953	0.6208427	56	0.7067393	0.7017700	97	0.3065870	0.3044312	336
	29	0.6276423	0.6343936	60	0.6967462	0.6916681	90	0.3022517	0.3000488	333
	30	+0.6410959	+0.6477488	− 64	−0.6865362	−0.6813508	+ 83	−0.2978224	−0.2955730	−330
	31	0.6543516	0.6609040	68	0.6761123	0.6708212	76	0.2933006	0.2910054	327
Feb.	1	0.6674052	0.6738549	71	0.6654779	0.6600828	69	0.2886877	0.2863474	323
	2	0.6802523	0.6865971	74	0.6546363	0.6491389	62	0.2839849	0.2816003	320
	3	0.6928886	0.6991264	77	0.6435909	0.6379930	55	0.2791938	0.2767657	316
	4	+0.7053099	+0.7114387	− 80	−0.6323454	−0.6266490	+ 48	−0.2743161	−0.2718453	−313
	5	0.7175122	0.7235301	82	0.6209039	0.6151110	40	0.2693535	0.2668409	309
	6	0.7294917	0.7353969	84	0.6092705	0.6033830	33	0.2643076	0.2617540	306
	7	0.7412449	0.7470356	86	0.5974490	0.5914691	25	0.2591800	0.2565861	302
	8	0.7527684	0.7584426	88	0.5854436	0.5793733	17	0.2539727	0.2513398	299
	9	+0.7640582	+0.7696144	− 90	−0.5732583	−0.5670996	+ 9	−0.2486874	−0.2460160	−295
	10	0.7751110	0.7805476	91	0.5608974	0.5546523	+ 1	0.2433257	0.2406168	292
	11	0.7859241	0.7912400	92	0.5483648	0.5420355	− 7	0.2378894	0.2351439	288
	12	0.7964949	0.8016886	93	0.5356648	0.5292534	15	0.2323803	0.2295991	284
	13	0.8068208	0.8118908	94	0.5228018	0.5163105	23	0.2268003	0.2239843	280
	14	+0.8168985	+0.8218436	− 95	−0.5097798	−0.5032105	− 31	−0.2211512	−0.2183013	−276
	15	+0.8267256	+0.8315442	− 95	−0.4966030	−0.4899579	− 39	−0.2154348	−0.2125520	−272

FOR GREENWICH MEAN NOON AND MIDNIGHT.

Day of Month.	JANUARY. True Longitude.	JANUARY. Latitude.	Day of Month.	FEBRUARY. True Longitude.	FEBRUARY. Latitude.	Day of Month.	MARCH. True Longitude.	MARCH. Latitude.
1.0	238° 25′ 22″.2	+4° 43′ 12″.5	1.0	284° 5′ 6″.9	+4° 36′ 28″.7	1.0	292° 51′ 43″.5	+4° 15′ 10″.3
1.5	244 37 35.7	4 53 0.4	1.5	290 1 33.0	4 20 12.1	1.5	298 46 17.9	3 54 22.2
2.0	250 47 25.0	4 59 18.2	2.0	295 57 8.1	4 1 8.2	2.0	304 40 23.3	3 31 5.7
2.5	256 55 1.5	5 2 5.6	2.5	301 52 6.8	3 39 29.3	2.5	310 34 23.4	3 5 34.1
3.0	263 0 35.2	5 1 24.3	3.0	307 46 43.1	3 15 28.6	3.0	316 28 40.5	2 38 1.9
3.5	269 4 14.7	+4 57 17.9	3.5	313 41 10.2	+2 49 20.7	3.5	322 23 35.0	+2 8 44.4
4.0	275 6 8.2	4 49 51.9	4.0	319 35 41.7	2 21 21.1	4.0	328 19 25.4	1 37 58.5
4.5	281 6 23.2	4 39 13.6	4.5	325 30 31.6	1 51 46.5	4.5	334 16 28.8	1 6 1.9
5.0	287 5 7.8	4 25 31.9	5.0	331 25 54.4	1 20 54.5	5.0	340 15 1.2	+0 33 12.6
5.5	293 2 30.7	4 8 57.1	5.5	337 22 5.8	0 49 3.4	5.5	346 15 17.1	−0 0 6.4
6.0	298 58 42.3	+3 49 41.1	6.0	343 19 23.0	+0 16 32.2	6.0	352 17 30.1	−0 33 37.3
6.5	304 53 54.2	3 27 57.0	6.5	349 18 4.4	−0 16 19.5	6.5	358 21 53.1	1 6 57.3
7.0	310 48 20.3	3 3 58.7	7.0	355 18 30.3	0 49 11.6	7.0	4 28 38.6	1 39 43.9
7.5	316 42 16.9	2 38 1.0	7.5	1 21 2.9	1 21 43.7	7.5	10 37 59.0	2 11 34.5
8.0	322 36 3.1	2 10 19.5	8.0	7 26 6.1	1 53 34.8	8.0	16 50 6.4	2 42 6.1
8.5	328 30 0.4	+1 41 10.3	8.5	13 34 5.7	−2 24 23.8	8.5	23 5 13.1	−3 10 55.8
9.0	334 24 33.3	1 10 49.9	9.0	19 45 28.4	2 53 49.2	9.0	29 23 31.7	3 37 40.8
9.5	340 20 9.7	0 39 35.5	9.5	26 0 42.4	3 21 29.1	9.5	35 45 14.9	4 1 59.0
10.0	346 17 19.7	+0 7 44.6	10.0	32 20 16.1	3 47 1.3	10.0	42 10 35.9	4 23 28.7
10.5	352 16 35.9	−0 24 24.7	10.5	38 44 37.8	4 10 3.6	10.5	48 39 47.6	4 41 49.3
11.0	358 18 33.6	−0 56 33.7	11.0	45 14 15.1	−4 30 13.3	11.0	55 13 2.8	−4 56 41.5
11.5	4 23 49.5	1 28 23.0	11.5	51 49 33.0	4 47 8.2	11.5	61 50 33.5	5 7 47.4
12.0	10 33 1.4	1 59 32.1	12.0	58 30 53.2	5 0 26.2	12.0	68 32 30.6	5 14 50.9
12.5	16 46 48.1	2 29 39.8	12.5	65 18 33.1	5 9 46.1	12.5	75 19 3.0	5 17 38.1
13.0	23 5 47.3	2 58 23.6	13.0	72 12 44.4	5 14 48.5	13.0	82 10 17.1	5 15 57.8
13.5	29 30 35.2	−3 25 19.5	13.5	79 13 31.0	−5 15 16.6	13.5	89 6 15.9	−5 9 42.2
14.0	36 1 45.7	3 50 2.7	14.0	86 20 48.1	5 10 56.4	14.0	96 6 58.3	4 58 47.3
14.5	42 39 47.7	4 12 7.1	14.5	93 34 20.9	5 1 38.7	14.5	103 12 17.9	4 43 13.7
15.0	49 25 4.4	4 31 6.0	15.0	100 53 43.8	4 47 20.5	15.0	110 22 2.6	4 23 7.1
15.5	56 17 50.9	4 46 32.4	15.5	108 18 20.2	4 28 5.5	15.5	117 35 53.9	3 58 38.9
16.0	63 18 12.8	−4 58 0.4	16.0	115 47 22.4	−4 4 5.1	16.0	124 53 26.3	−3 30 7.2
16.5	70 26 4.3	5 5 5.4	16.5	123 19 52.9	3 35 39.2	16.5	132 14 7.2	2 57 56.2
17.0	77 41 6.9	5 7 26.5	17.0	130 54 46.1	3 3 16.2	17.0	139 37 17.2	2 22 36.4
17.5	85 2 48.2	5 4 47.0	17.5	138 30 50.2	2 27 32.3	17.5	147 2 10.5	1 44 44.4
18.0	92 30 22.1	4 56 56.7	18.0	146 6 51.0	1 49 10.0	18.0	154 27 56.3	1 5 1.9
18.5	100 2 50.0	−4 43 53.1	18.5	153 41 33.3	−1 8 56.9	18.5	161 53 40.1	−0 24 13.8
19.0	107 39 1.6	4 25 42.5	19.0	161 13 45.6	−0 27 42.9	19.0	169 18 25.0	+0 16 52.9
19.5	115 17 38.5	4 2 40.5	19.5	168 42 21.5	+0 13 41.3	19.5	176 41 14.1	0 57 30.8
20.0	122 57 17.0	3 35 12.0	20.0	176 6 22.6	0 54 27.4	20.0	184 1 12.2	1 36 54.6
20.5	130 36 32.1	3 3 50.3	20.5	183 25 0.3	1 33 50.9	20.5	191 17 28.0	2 14 22.4
21.0	138 14 1.6	−2 29 15.7	21.0	190 37 36.2	+2 11 11.7	21.0	198 29 15.3	+2 49 16.9
21.5	145 48 29.1	1 52 13.2	21.5	197 43 43.0	2 45 56.6	21.5	205 35 55.4	3 21 6.7
22.0	153 18 47.4	1 13 30.8	22.0	204 43 4.1	3 17 38.6	22.0	212 36 56.8	3 49 27.1
22.5	160 44 0.7	−0 33 56.5	22.5	211 35 32.8	3 45 56.7	22.5	219 31 56.9	4 13 59.5
23.0	168 3 25.0	+0 5 43.3	23.0	218 21 11.9	4 10 36.1	23.0	226 20 41.8	4 34 31.4
23.5	175 16 29.2	+0 44 45.5	23.5	225 0 11.9	+4 31 27.2	23.5	233 3 6.4	+4 50 56.2
24.0	182 22 54.5	1 22 31.5	24.0	231 32 49.7	4 48 24.7	24.0	239 39 13.4	5 3 12.1
24.5	189 22 33.0	1 58 27.8	24.5	237 59 27.7	5 1 26.8	24.5	246 9 13.0	5 11 21.1
25.0	196 15 26.7	2 32 6.2	25.0	244 20 32.5	5 10 35.0	25.0	252 33 22.0	5 15 28.5
25.5	203 1 45.7	3 3 3.8	25.5	250 36 33.3	5 15 52.9	25.5	258 52 2.8	5 15 42.1
26.0	209 41 46.6	+3 31 2.3	26.0	256 48 1.6	+5 17 25.7	26.0	265 5 42.2	+5 12 11.3
26.5	216 15 50.8	3 55 47.8	26.5	262 55 30.1	5 15 19.8	26.5	271 14 50.7	5 5 6.8
27.0	222 44 23.4	4 17 10.0	27.0	268 59 31.3	5 9 43.2	27.0	277 20 1.5	4 54 39.9
27.5	229 7 51.3	4 35 2.0	27.5	275 0 38.1	5 0 44.4	27.5	283 21 49.7	4 41 2.8
28.0	235 26 42.8	4 49 19.4	28.0	280 59 22.1	4 48 32.5	28.0	289 20 51.5	4 24 27.8
28.5	241 41 26.3	4 59 59.9	28.5	286 56 14.1	4 33 17.6	28.5	295 17 43.6	4 5 7.5
29.0	247 52 29.7	+5 7 3.5	29.0	292 51 43.5	+4 15 10.3	29.0	301 13 2.7	+3 43 14.8
29.5	254 0 20.1	5 10 31.5	29.5	298 46 17.9	3 54 22.2	29.5	307 7 24.7	3 19 3.0
30.0	260 5 22.9	5 10 26.9	30.0	304 40 23.3	3 31 5.7	30.0	313 1 24.6	2 52 45.9
30.5	266 8 1.8	5 6 54.0	30.5	310 34 23.4	3 5 34.1	30.5	318 55 36.0	2 24 37.9
31.0	272 8 39.0	4 59 58.6	31.0	316 28 40.5	2 38 1.9	31.0	324 50 30.8	1 54 54.0
31.5	278 7 34.6	+4 49 47.4	31.5	322 23 35.0	+2 8 44.4	31.5	330 46 38.1	+1 23 50.5

FOR GREENWICH MEAN NOON AND MIDNIGHT.

Day of Month.	APRIL. True Longitude. ° ′ ″	APRIL. Latitude. ° ′ ″	Day of Month.	MAY. True Longitude. ° ′ ″	MAY. Latitude. ° ′ ″	Day of Month	JUNE. True Longitude. ° ′ ″	JUNE. Latitude. ° ′ ″
1.0	336 44 25.5	+0 51 44.4	1.0	9 17 53.4	−2 6 52.4	1.0	56 51 1.3	−4 50 30.6
1.5	342 44 17.6	+0 18 54.3	1.5	15 35 20.0	2 36 42.2	1.5	63 46 10.2	4 57 45.2
2.0	348 46 36.0	−0 14 20.2	2.0	21 57 20.2	3 4 54.0	2.0	70 46 11.6	5 0 37.5
2.5	354 51 29.7	0 47 38.3	2.5	28 24 1.3	3 31 2.9	2.5	77 50 30.7	4 58 56.1
3.0	0 59 44.5	1 20 37.9	3.0	34 55 24.6	3 54 43.6	3.0	84 58 26.6	4 52 35.0
3.5	7 11 2.9	−1 52 56.0	3.5	41 31 25.5	−4 15 31.4	3.5	92 9 14.0	4 41 34.2
4.0	13 25 44.7	2 24 8.5	4.0	48 11 54.4	4 33 2.9	4.0	99 22 5.5	4 26 0.6
4.5	19 43 56.3	2 53 51.2	4.5	54 56 35.9	4 46 56.8	4.5	106 36 13.4	4 6 7.2
5.0	26 5 41.6	3 21 39.4	5.0	61 45 10.1	4 56 54.3	5.0	113 50 51.3	3 42 13.2
5.5	32 31 1.8	3 47 8.9	5.5	68 37 13.4	5 2 40.1	5.5	121 5 16.6	3 14 43.3
6.0	38 59 55.6	−4 9 56.2	6.0	75 32 19.9	−5 4 2.9	6.0	128 18 51.4	−2 44 6.9
6.5	45 32 20.1	4 29 30.1	6.5	82 30 1.8	5 0 56.7	6.5	135 31 3.5	2 10 56.9
7.0	52 8 10.5	4 45 57.0	7.0	89 29 51.0	4 53 19.9	7.0	142 41 27.0	1 35 48.6
7.5	58 47 21.2	4 58 31.7	7.5	96 31 20.4	4 41 15.7	7.5	149 49 42.0	0 59 18.7
8.0	65 29 45.7	5 7 7.6	8.0	103 34 4.4	4 24 53.3	8.0	156 55 31.3	−0 22 4.4
8.5	72 15 17.0	−5 11 31.9	8.5	110 37 39.9	−4 4 26.2	8.5	163 58 54.9	+0 15 17.9
9.0	79 3 48.2	5 11 35.6	9.0	117 41 47.1	3 40 12.7	9.0	170 59 38.8	0 52 12.8
9.5	85 55 12.4	5 7 13.1	9.5	124 46 9.3	3 12 35.1	9.5	177 57 43.8	1 28 6.4
10.0	92 49 22.6	4 58 22.9	10.0	131 50 32.5	2 41 59.4	10.0	184 53 9.7	2 2 27.4
10.5	99 46 12.0	4 45 7.5	10.5	138 54 45.4	2 8 54.8	10.5	191 45 57.2	2 34 46.9
11.0	106 45 33.6	−4 27 33.9	11.0	145 58 39.1	−1 33 52.6	11.0	198 36 7.2	+3 4 38.9
11.5	113 47 19.6	4 5 53.2	11.5	153 2 5.9	0 57 26.5	11.5	205 23 39.9	3 31 40.5
12.0	120 51 21.2	3 40 21.6	12.0	160 4 58.4	−0 20 11.3	12.0	212 8 34.3	3 55 32.1
12.5	127 57 28.2	3 11 19.4	12.5	167 7 8.9	+0 17 17.8	12.5	218 50 47.8	4 15 57.3
13.0	135 5 28.0	2 39 11.4	13.0	174 8 28.6	0 54 25.0	13.0	225 30 16.7	4 32 43.6
13.5	142 15 5.3	−2 4 26.9	13.5	181 8 46.9	+1 30 35.2	13.5	232 6 55.8	+4 45 41.7
14.0	149 26 1.2	1 27 38.8	14.0	188 7 51.3	2 5 14.9	14.0	238 40 39.0	4 54 46.1
14.5	156 37 53.7	0 49 23.3	14.5	195 5 26.2	2 37 52.5	14.5	245 11 19.6	4 59 54.8
15.0	163 50 16.6	−0 10 19.3	15.0	202 1 14.4	3 7 59.0	15.0	251 38 51.0	5 1 9.2
15.5	171 2 40.0	+0 28 52.7	15.5	208 54 56.0	3 35 8.2	15.5	258 3 7.4	4 58 34.3
16.0	178 14 30.7	+1 7 31.8	16.0	215 46 10.0	+3 58 58.8	16.0	264 24 4.6	+4 52 17.4
16.5	185 25 12.5	1 44 57.8	16.5	222 34 34.5	4 19 12.8	16.5	270 41 40.3	4 42 28.5
17.0	192 34 7.5	2 20 32.7	17.0	229 19 48.0	4 35 36.9	17.0	276 55 54.8	4 29 20.1
17.5	199 40 37.3	2 53 41.5	17.5	236 1 30.3	4 48 2.8	17.5	283 6 51.6	4 13 6.5
18.0	206 44 4.1	3 23 53.5	18.0	242 39 23.3	4 56 26.4	18.0	289 14 37.6	3 54 3.3
18.5	213 43 52.2	+3 50 43.0	18.5	249 13 12.3	+5 0 47.8	18.5	295 19 23.4	+3 32 26.9
19.0	220 39 29.4	4 13 49.9	19.0	255 42 46.6	5 1 11.0	19.0	301 21 23.0	3 8 34.5
19.5	227 30 28.2	4 32 59.7	19.5	262 8 0.1	4 57 43.8	19.5	307 20 54.7	2 42 43.8
20.0	234 16 26.9	4 48 3.3	20.0	268 28 52.0	4 50 36.3	20.0	313 18 20.4	2 15 12.6
20.5	240 57 10.0	4 58 57.2	20.5	274 45 26.6	4 40 0.9	20.5	319 14 5.3	1 46 18.4
21.0	247 32 28.9	+5 5 42.3	21.0	280 57 53.6	+4 26 11.7	21.0	325 8 38.0	+1 16 18.9
21.5	254 2 22.1	5 8 23.5	21.5	287 6 27.7	4 9 23.9	21.5	331 2 30.1	0 45 31.6
22.0	260 28 54.8	5 7 8.6	22.0	293 11 29.0	3 49 53.5	22.0	336 56 16.0	+0 14 13.7
22.5	266 46 18.8	5 2 8.1	22.5	299 13 21.6	3 27 57.0	22.5	342 50 32.0	−0 17 17.6
23.0	273 0 51.9	4 53 34.4	23.0	305 12 34.0	3 3 50.7	23.0	348 45 56.6	0 48 14.8
23.5	279 10 57.0	+4 41 40.7	23.5	311 9 38.1	+2 37 51.0	23.5	354 43 9.5	−1 19 50.5
24.0	285 17 1.6	4 26 41.3	24.0	317 5 8.5	2 10 14.3	24.0	0 42 51.2	1 50 16.6
24.5	291 19 37.0	4 8 50.7	24.5	322 59 42.6	1 41 16.7	24.5	6 45 42.1	2 19 44.4
25.0	297 19 17.5	3 48 23.6	25.0	328 53 59.7	1 11 14.4	25.0	12 52 22.1	2 47 54.7
25.5	303 16 39.8	3 25 34.9	25.5	334 48 40.1	0 40 23.8	25.5	19 3 20.8	3 14 27.3
26.0	309 12 22.2	+3 0 39.2	26.0	340 44 25.0	+0 9 1.2	26.0	25 19 41.0	−3 39 1.0
26.5	315 7 4.0	2 33 51.4	26.5	346 41 55.6	−0 22 36.3	26.5	31 41 28.1	4 1 13.8
27.0	321 1 25.0	2 5 26.5	27.0	352 41 52.6	0 54 10.9	27.0	38 9 18.7	4 20 43.0
27.5	326 56 4.7	1 35 39.9	27.5	358 44 55.4	1 25 24.0	27.5	44 43 34.6	4 37 5.8
28.0	332 51 42.1	1 4 47.3	28.0	4 51 41.1	1 55 56.0	28.0	51 24 20.9	4 49 59.3
28.5	338 48 54.4	0 33 5.5	28.5	11 2 44.2	2 25 26.0	28.5	58 12 10.5	4 59 1.7
29.0	344 48 17.4	+0 0 51.7	29.0	17 18 35.4	−2 53 32.0	29.0	65 6 32.3	−5 3 53.2
29.5	350 50 24.5	−0 31 35.5	29.5	23 39 40.3	3 19 51.0	29.5	72 7 21.2	5 4 17.0
30.0	356 55 45.9	1 3 56.1	30.0	30 6 19.0	3 43 58.8	30.0	79 14 12.4	5 0 0.5
30.5	3 4 48.0	1 35 49.2	30.5	36 38 44.7	4 5 30.7	30.5	86 26 30.5	4 50 56.4
31.0	9 17 53.4	−2 6 52.4	31.0	43 17 3.4	−4 21 2.3	31.0	93 43 30.9	−4 37 3.8
31.5	15 35 20.0	−2 36 42.2	31.5	50 1 12.5	−4 39 9.7	31.5	101 [illegible] 20.9	−4 18 29.3

FOR GREENWICH MEAN NOON AND MIDNIGHT.

Day of Month.	JULY. True Longitude.	JULY. Latitude.	Day of Month.	AUGUST. True Longitude.	AUGUST. Latitude.	Day of Month.	SEPTEMBER. True Longitude.	SEPTEMBER. Latitude.
	° ′ ″	° ′ ″		° ′ ″	° ′ ″		° ′ ″	° ′ ″
1.0	93 43 30.9	−4 37 3.8	1.0	147 8 51.6	−0 56 4.6	1.0	200 18 49.8	+3 37 [illegible]
1.5	101 4 20.9	4 18 29.3	1.5	154 40 44.7	−0 14 57.1	1.5	207 30 28.7	4 4 [illegible]
2.0	108 28 1.6	3 55 27.0	2.0	162 9 56.8	+0 26 13.2	2.0	214 35 44.6	4 27 [illegible]
2.5	115 53 30.7	3 28 18.8	2.5	169 35 33.4	1 6 38.4	2.5	221 34 22.6	4 46 [illegible]
3.0	123 19 45.2	2 57 33.3	3.0	176 56 48.7	1 45 34.2	3.0	228 26 17.9	5 1 [illegible]
3.5	130 45 43.5	−2 23 45.2	3.5	184 13 6.4	+2 22 21.3	3.5	235 11 33.7	+5 10 [illegible]
4.0	138 10 28.3	1 47 33.9	4.0	191 24 0.0	2 56 25.7	4.0	241 50 20.8	5 16 [illegible]
4.5	145 33 8.5	1 9 41.5	4.5	198 29 12.1	3 27 19.7	4.5	248 22 56.1	5 17 [illegible]
5.0	152 53 0.3	−0 30 51.6	5.0	205 28 33.9	3 54 41.6	5.0	254 49 41.5	5 15 [illegible]
5.5	160 9 28.1	+0 8 12.9	5.5	212 22 4.2	4 18 15.3	5.5	261 11 2.5	5 8 [illegible]
6.0	167 22 4.9	+0 46 50.7	6.0	219 9 48.0	+4 37 50.1	6.0	267 27 27.2	+4 58 [illegible]
6.5	174 30 31.6	1 24 23.1	6.5	225 51 55.4	4 53 19.6	6.5	273 39 25.0	4 44 51.1
7.0	181 34 36.4	2 0 15.3	7.0	232 28 40.7	5 4 41.5	7.0	279 47 26.9	4 28 [illegible]
7.5	188 34 14.2	2 33 56.5	7.5	239 0 21.1	5 11 56.9	7.5	285 52 3.6	4 8 [illegible]
8.0	195 29 24.8	3 5 0.0	8.0	245 27 15.7	5 15 9.6	8.0	291 53 45.3	3 46 [illegible]
8.5	202 20 12.1	+3 33 3.3	8.5	251 49 45.0	+5 14 25.7	8.5	297 53 1.7	+3 21 [illegible]
9.0	209 6 43.0	3 57 48.5	9.0	258 8 10.0	5 9 53.2	9.0	303 50 21.1	2 55 [illegible]
9.5	215 49 6.4	4 19 1.1	9.5	264 22 51.5	5 1 41.9	9.5	309 46 10.6	2 26 [illegible]
10.0	222 27 32.2	4 36 30.6	10.0	270 34 10.3	4 50 3.1	10.0	315 40 55.5	1 57 [illegible]
10.5	229 2 10.6	4 50 9.7	10.5	276 42 26.4	4 35 9.1	10.5	321 34 59.6	1 26 [illegible]
11.0	235 33 11.8	+4 59 54.5	11.0	282 47 58.9	+4 17 13.7	11.0	327 28 45.2	+0 54 11.2
11.5	242 0 45.3	5 5 43.8	11.5	288 51 6.4	3 56 31.3	11.5	333 22 32.9	+0 21 41.4
12.0	248 25 0.1	5 7 39.4	12.0	294 52 6.3	3 33 17.6	12.0	339 16 41.8	−0 11 3.7
12.5	254 46 4.2	5 5 45.6	12.5	300 51 15.4	3 7 49.0	12.5	345 11 29.9	0 43 44.3
13.0	261 4 5.2	5 0 9.0	13.0	306 48 50.1	2 40 22.8	13.0	351 7 14.0	1 16 0.7
13.5	267 19 10.0	+4 50 58.4	13.5	312 45 6.4	+2 11 16.9	13.5	357 4 9.9	−1 47 32.7
14.0	273 31 25.4	4 38 24.7	14.0	318 40 20.0	1 40 49.7	14.0	3 2 32.9	2 18 0.4
14.5	279 40 58.3	4 22 40.5	14.5	324 34 46.9	1 9 20.2	14.5	9 2 37.7	2 47 4.3
15.0	285 47 56.1	4 4 0.1	15.0	330 28 43.5	0 37 7.6	15.0	15 4 39.0	3 14 24.5
15.5	291 52 27.3	3 42 39.0	15.5	336 22 27.0	+0 4 31.1	15.5	21 8 51.5	3 39 42.1
16.0	297 54 41.1	+3 18 53.7	16.0	342 16 15.1	−0 28 9.8	16.0	27 15 30.0	−4 2 38.6
16.5	303 54 48.9	2 53 1.8	16.5	348 10 26.8	1 0 35.5	16.5	33 24 49.6	4 22 56.3
17.0	309 53 3.6	2 25 21.3	17.0	354 5 22.3	1 32 26.7	17.0	39 37 6.5	4 40 18.4
17.5	315 49 40.2	1 56 10.8	17.5	0 1 23.0	2 3 24.3	17.5	45 52 37.0	4 54 29.2
18.0	321 44 56.1	1 25 48.8	18.0	5 58 52.0	2 33 9.5	18.0	52 11 38.2	5 5 14.1
18.5	327 39 11.3	+0 54 34.1	18.5	11 58 13.6	−3 1 23.3	18.5	58 34 27.4	−5 12 20.0
19.0	333 32 47.9	+0 22 45.5	19.0	17 59 53.7	3 27 47.4	19.0	65 1 22.2	5 15 35.2
19.5	339 26 10.7	−0 9 18.8	19.5	24 4 19.5	3 52 3.5	19.5	71 32 40.2	5 14 49.7
20.0	345 19 47.0	0 41 20.2	20.0	30 11 59.3	4 13 53.8	20.0	78 8 37.9	5 9 55.8
20.5	351 14 6.1	1 13 0.3	20.5	36 23 21.8	4 33 0.4	20.5	84 49 30.5	5 0 48.3
21.0	357 9 39.8	−1 44 1.1	21.0	42 38 56.2	−4 49 5.9	21.0	91 35 31.1	−4 47 24.7
21.5	3 7 1.7	2 14 4.6	21.5	48 59 11.2	5 1 53.2	21.5	98 26 50.0	4 29 46.2
22.0	9 6 46.7	2 42 52.4	22.0	55 24 34.5	5 11 5.9	22.0	105 23 33.0	4 7 58.1
22.5	15 9 31.1	3 10 5.9	22.5	61 55 31.7	5 16 28.3	22.5	112 25 41.2	3 42 10.3
23.0	21 15 51.6	3 35 26.4	23.0	68 32 25.9	5 17 45.9	23.0	119 33 9.4	3 12 37.9
23.5	27 26 24.8	−3 58 34.6	23.5	75 15 35.4	−5 14 46.3	23.5	126 45 45.1	−2 39 41.9
24.0	33 41 46.5	4 19 10.9	24.0	82 5 13.9	5 7 19.5	24.0	134 3 7.9	2 3 49.5
24.5	40 2 30.5	4 36 55.2	24.5	89 1 28.1	4 55 18.6	24.5	141 24 48.8	1 25 33.7
25.0	46 29 7.8	4 51 27.4	25.0	96 4 17.3	4 38 41.2	25.0	148 50 10.0	0 45 33.3
25.5	53 2 5.4	5 2 27.5	25.5	103 13 31.5	4 17 30.3	25.5	156 18 24.9	−0 4 32.0
26.0	59 41 44.6	−5 9 36.1	26.0	110 28 51.1	−3 51 55.1	26.0	163 48 39.5	+0 36 43.4
26.5	66 28 20.2	5 12 35.1	26.5	117 49 46.3	3 22 11.8	26.5	171 19 53.5	1 17 23.9
27.0	73 21 58.6	5 11 8.7	27.0	125 15 37.0	2 48 44.2	27.0	178 51 1.9	1 56 40.9
27.5	80 22 36.6	5 5 4.0	27.5	132 45 33.2	2 12 4.0	27.5	186 20 57.8	2 33 48.2
28.0	87 30 0.7	4 54 12.8	28.0	140 18 36.0	1 32 49.8	28.0	193 48 34.8	3 8 3.8
28.5	94 43 46.0	4 38 32.6	28.5	147 53 40.3	0 51 46.3	28.5	201 12 49.2	3 38 51.6
29.0	102 3 16.9	−4 18 7.4	29.0	155 29 35.7	−0 9 42.7	29.0	208 32 43.2	+4 5 42.4
29.5	109 27 47.2	3 53 9.1	29.5	163 5 10.3	+0 32 29.4	29.5	215 47 26.6	4 28 15.0
30.0	116 56 20.4	3 23 57.4	30.0	170 39 12.3	1 13 58.4	30.0	222 56 18.0	4 46 15.7
30.5	124 27 53.1	2 51 0.6	30.5	178 10 33.7	1 53 55.1	30.5	229 58 46.5	4 59 38.2
31.0	132 1 16.5	2 14 54.2	31.0	185 38 11.9	2 31 34.3	31.0	236 54 32.0	5 8 22.5
31.5	139 35 19.7	−1 36 20.0	31.5	193 1 12.4	+3 6 16.8	31.5	243 43 24.6	+5 12 34.5

TABLE FOR THE LIBRATION OF THE MOON.

Argument, (☊—λ) or (☊—λ—180°).

Δλ	$\frac{1}{a}$	B		☊—λ	Δλ	$\frac{1}{a}$	B	
0′.0	39	0° 0′.0	180°	46°	0′.6	56	1° 3′.9	134°
0.0	39	0 1.6	179	47	0.6	57	1 4.9	133
0.0	39	0 3.1	178	48	0.6	58	1 6.0	132
0.1	39	0 4.7	177	49	0.6	59	1 7.0	131
0.1	39	0 6.2	176	50	0.6	60	1 8.0	130
0.1	39	0 7.7	175	51	0.6	62	1 9.0	129
0.2	39	0 9.3	174	52	0.6	63	1 10.0	128
0.2	39	0 10.8	173	53	0.5	64	1 10.9	127
0.2	39	0 12.4	172	54	0.5	66	1 11.8	126
0.2	39	0 13.9	171	55	0.5	67	1 12.7	125
0.2	39	0 15.4	170	56	0.5	69	1 13.6	124
0.3	39	0 16.9	169	57	0.5	71	1 14.5	123
0.3	40	0 18.5	168	58	0.5	73	1 15.3	122
0.3	40	0 20.0	167	59	0.5	75	1 16.1	121
0.3	40	0 21.5	166	60	0.5	77	1 16.9	120
0.3	40	0 23.0	165	61	0.5	80	1 17.6	119
0.3	40	0 24.5	164	62	0.5	83	1 18.4	118
0.3	40	0 26.0	163	63	0.5	86	1 19.1	117
0.3	41	0 27.4	162	64	0.5	89	1 19.8	116
0.4	41	0 28.9	161	65	0.4	92	1 20.4	115
0.4	41	0 30.4	160	66	0.4	95	1 21.1	114
0.4	41	0 31.8	159	67	0.4	99	1 21.7	113
0.4	42	0 33.2	158	68	0.4	103	1 22.3	112
0.4	42	0 34.7	157	69	0.4	108	1 22.9	111
0.4	42	0 36.1	156	70	0.4	113	1 23.4	110
0.4	43	0 37.5	155	71	0.4	119	1 23.9	109
0.5	43	0 38.9	154	72	0.4	125	1 24.4	108
0.5	43	0 40.3	153	73	0.4	132	1 24.9	107
0.5	44	0 41.7	152	74	0.3	141	1 25.3	106
0.5	44	0 43.1	151	75	0.3	150	1 25.7	105
0.5	45	0 44.4	150	76	0.3	160	1 26.1	104
0.5	45	0 45.7	149	77	0.3	172	1 26.5	103
0.5	46	0 47.0	148	78	0.2	186	1 26.8	102
0.5	46	0 48.4	147	79	0.2	202	1 27.1	101
0.5	47	0 49.7	146	80	0.2	222	1 27.4	100
0.5	47	0 51.0	145	81	0.2	247	1 27.7	99
0.5	48	0 52.2	144	82	0.2	278	1 27.9	98
0.5	48	0 53.4	143	83	0.1	318	1 28.1	97
0.6	49	0 54.7	142	84	0.1	370	1 28.3	96
0.6	50	0 55.9	141	85	0.1	440	1 28.5	95
0.6	50	0 57.1	140	86	0.1	555	1 28.6	94
0.6	51	0 58.3	139	87	0.1	740	1 28.7	93
0.6	52	0 59.4	138	88	0.0	1110	1 28.7	92
0.6	53	1 0.6	137	89	0.0	2220	1 28.8	91
0.6	54	1 1.7	136	90	0.0	∞	1 28.8	90
0.6	55	1 2.8	135					
Δλ	$\frac{1}{a}$	B	☊—λ		Δλ	$\frac{1}{a}$	B	☊—λ

Δλ has the sign of tan (λ—☊)
a has the sign of cos (☊—λ)
B has the sign of sin (☊—λ)

PART II

ASTRONOMICAL EPHEMERIS

FOR THE

MERIDIAN OF WASHINGTON

EPH 86—16—7

FORMULÆ FOR THE REDUCTION OF THE POSITIONS OF THE FIXED STARS, US THE NOTATION OF BESSEL, AND THE CONSTANTS OF PETERS AND STRUVE.

NOTATION.

τ, the time, reckoned in units of one year, from the beginning of the Besselian fictitious (1885, December $30^d.711$ = 1886, January $0^d.0 - 0^d.289$, Washington mean time),

α_0, δ_0, the star's mean right ascension and declination at the beginning of the fictitious year,

α, δ, the star's apparent right ascension and declination at the time τ,

μ, μ', the annual proper motion in right ascension and declination,

$\odot$, the sun's true longitude,

Ω, the longitude of the moon's ascending node,

ω, the obliquity of the ecliptic,

Γ, the longitude of the sun's perigee,

Γ', the longitude of the moon's perigee,

☾, the moon's mean longitude.

BESSELIAN STAR-NUMBERS.

$$\begin{aligned} A = \tau &- 0.34248 \sin \Omega && - 0.00011 \sin (3 \odot - \Gamma) \\ &+ 0.00410 \sin 2 \Omega && - 0.00005 \sin 2 (\odot - \Omega) \\ &- 0.02521 \sin 2 \odot && + 0.00010 \sin 2 (\odot - \Gamma') \\ &+ 0.00293 \sin (\odot + 82^\circ 8') && + 0.00009 \sin (2 \Gamma' - \Omega) \\ &+ 0.00025 \sin (2 \odot - \Omega) && + 0.00005 \cos \Gamma' \\ &- 0.00405 \sin 2 ☾ && + 0.00004 \sin 2 \Gamma' \\ &+ 0.00135 \sin (☾ - \Gamma') \end{aligned}$$

$$\begin{aligned} B = &- 9''.2239 \cos \Omega && - 0''.0027 \cos (3 \odot - \Gamma) \\ &+ 0.0895 \cos 2 \Omega && + 0.0067 \cos (2 \odot - \Omega) \\ &- 0.5506 \cos 2 \odot && + 0.0024 \cos (2 \Gamma' - \Omega) \\ &- 0.0092 \cos (\odot + 280^\circ 57') && - 0.0023 \sin \Gamma' \\ &- 0.0886 \cos 2 ☾ && + 0.0008 \cos 2 \Gamma' \end{aligned}$$

$$C = - 20''.4451 \cos \omega \cos \odot$$
$$D = - 20.4451 \sin \odot$$
$$E = - 0.0461 \sin \Omega + 0''.0014 \sin 2 \Omega - 0''.0033 \sin 2 \odot$$

BESSEL's *Star-Constants.*

$a = 3^s.07244 + 1^s.33689 \sin \alpha_0 \tan \delta_0$ = precession in right ascension

$b = \frac{1}{15} \cos \alpha_0 \tan \delta_0$

$c = \frac{1}{15} \cos \alpha_0 \sec \delta_0$

$d = \frac{1}{15} \sin \alpha_0 \sec \delta_0$

$a' = 20''.0533 \cos \alpha_0$ = precession in declination

$b' = - \sin \alpha_0$

$c' = \tan \omega \cos \delta_0 - \sin \alpha_0 \sin \delta_0$

$d' = \cos \alpha_0 \sin \delta_0$

Reduction to Apparent Position.

$\alpha = \alpha_0 + \tau \mu + A a + B b + C c + D d + E$ (in time)

$\delta = \delta_0 + \tau \mu' + A a' + B b' + C c' + D d'$ (in arc)

INDEPENDENT STAR-NUMBERS.

$f = 46''.0866\ A + E$ (in arc) $= 3^s.07244\ A + \frac{1}{15} E$ (in time)

$g \sin G = B$ $\qquad h \sin H = C$ $\qquad i = C \tan \omega$

$g \cos G = 20''.0533\ A$ $\qquad h \cos H = D$

Reduction to Apparent Position.

$\alpha = \alpha_0 + f + \tau \mu + \frac{1}{15} g \sin (G + \alpha_0) \tan \delta + \frac{1}{15} h \sin (H + \alpha_0) \sec \delta$ (in time)

$\delta = \delta_0 + \tau \mu' + g \cos (G + \alpha_0) + h \cos (H + \alpha_0) \sin \delta + i \cos \delta$ (in arc)

NOTES.—(1) The independent star-numbers are more convenient, when only one or two positions of a star are required, or when BESSEL's star-constants are not kno sufficient accuracy. Otherwise, the Besselian star-numbers are more convenien

(2) In using the star-constants of the *British Association Catalogue*, a, b, c, d, a', must be changed to $c, d, a, b, -c', -d', -a', -b'$, respectively.

$E = -0''.$[illegible]

FOR WASHINGTON MEAN MIDNIGHT.

Solar Day. (Sid. Hour.)		τ	f In Arc.	f In Time.	G In Arc.	G In Time.	H In Arc.	H In Time.	Log g.	Log h.	i	Log i.
		y	″	s	° ′	h m	° ′	h m			″	
Apr.	1	0.2513	+ 7.09	+0.473	69 48	4 39.2	256 31	17 6.1	+0.9519	+1.2750	−7.95	−0.9003
	2	0.2541	7.07	0.471	69 50	4 39.3	255 28	17 1.9	0.9517	1.2753	7.92	0.8986
	3	0.2568	7.06	0.471	69 55	4 39.7	254 24	16 57.6	0.9524	1.2756	7.88	0.8968
	4	0.2595	7.07	0.471	69 58	4 39.9	253 20	16 53.3	0.9540	1.2760	7.85	0.8947
	5	0.2623	7.11	0.474	69 58	4 39.9	252 17	16 49.1	0.9563	1.2763	7.81	0.8926
(13h.0)	6	0.2650	+ 7.20	+0.480	69 50	4 39.3	251 14	16 44.9	+0.9590	+1.2767	−7.77	−0.8904
	7	0.2677	7.32	0.488	69 37	4 38.5	250 11	16 40.7	0.9620	1.2771	7.73	0.8880
	8	0.2705	7.48	0.499	69 17	4 37.1	249 8	16 36.5	0.9645	1.2775	7.68	0.8855
	9	0.2732	7.65	0.510	68 52	4 35.5	248 5	16 32.3	0.9664	1.2780	7.64	0.8828
	10	0.2760	7.83	0.522	68 26	4 33.7	247 2	16 28.1	0.9675	1.2784	7.59	0.8800
	11	0.2787	+ 7.98	+0.532	68 0	4 32.0	246 0	16 24.0	+0.9679	+1.2789	−7.53	−0.8770
	12	0.2814	8.10	0.540	67 38	4 30.5	244 57	16 19.8	0.9677	1.2794	7.48	0.8739
	13	0.2842	8.19	0.546	67 22	4 29.5	243 55	16 15.7	0.9671	1.2799	7.43	0.8707
	14	0.2869	8.24	0.549	67 11	4 28.7	242 53	16 11.5	0.9666	1.2804	7.37	0.8673
	15	0.2896	8.26	0.551	67 7	4 28.5	241 52	16 7.5	0.9665	1.2809	7.31	0.8637
	16	0.2924	+ 8.27	+0.551	67 7	4 28.5	240 50	16 3.3	+0.9671	+1.2815	−7.25	−0.8600
	17	0.2951	8.29	0.553	67 8	4 28.5	239 49	15 59.3	0.9685	1.2820	7.18	0.8561
	18	0.2979	8.33	0.555	67 8	4 28.5	238 47	15 55.1	0.9707	1.2826	7.11	0.8521
	19	0.3006	8.40	0.560	67 5	4 28.3	237 46	15 51.1	0.9736	1.2831	7.05	0.8479
	20	0.3033	8.51	0.567	66 57	4 27.8	236 46	15 47.1	0.9767	1.2837	6.98	0.8436
(14h.0)	21	0.3061	+ 8.65	+0.577	66 42	4 26.8	235 45	15 43.0	+0.9797	+1.2843	−6.90	−0.8390
	22	0.3088	8.82	0.588	66 23	4 25.5	234 44	15 38.9	0.9823	1.2849	6.83	0.8343
	23	0.3115	8.99	0.599	66 2	4 24.1	233 44	15 34.9	0.9842	1.2855	6.75	0.8295
	24	0.3143	9.15	0.610	65 38	4 22.5	232 44	15 30.9	0.9853	1.2861	6.67	0.8244
	25	0.3170	9.29	0.619	65 16	4 21.1	231 44	15 26.9	0.9857	1.2868	6.59	0.8191
	26	0.3198	+ 9.38	+0.625	64 59	4 19.9	230 45	15 23.0	+0.9855	+1.2874	−6.51	−0.8137
	27	0.3225	9.44	0.629	64 47	4 19.1	229 45	15 19.0	0.9850	1.2880	6.43	0.8081
	28	0.3252	9.47	0.631	64 41	4 18,7	228 46	15 15.1	0.9847	1.2886	6.34	0.8022
	29	0.3280	9.48	0.632	64 40	4 18.7	227 47	15 11.1	0.9849	1.2892	6.26	0.7963
	30	0.3307	9.50	0.633	64 41	4 18.7	226 48	15 7.2	0.9859	1.2899	6.17	0.7900
May	1	0.3335	+ 9.52	+0.635	64 43	4 18.9	225 50	15 3.3	+0.9877	+1.2905	−6.08	−0.7836
	2	0.3362	9.58	0.639	64 44	4 18.9	224 51	14 59.4	0.9902	1.2911	5.99	0.7770
	3	0.3389	9.68	0.645	64 37	4 18.5	223 53	14 55.5	0.9933	1.2918	5.89	0.7701
	4	0.3417	9.83	0.655	64 26	4 17.7	222 55	14 51.7	0.9966	1.2924	5.79	0.7629
	5	0.3444	10.01	0.667	64 8	4 16.5	221 57	14 47.8	0.9997	1.2930	5.70	0.7555
	6	0.3471	+10.21	+0.681	63 45	4 15.0	221 0	14 44.0	+1.0024	+1.2937	−5.60	−0.7480
(15h.0)	7	0.3499	10.41	0.694	63 18	4 13.2	220 2	14 40.1	1.0045	1.2943	5.50	0.7401
	8	0.3526	10.61	0.707	62 51	4 11.4	219 5	14 36.3	1.0058	1.2949	5.40	0.7320
	9	0.3554	10.77	0.718	62 26	4 9.7	218 8	14 32.5	1.0064	1.2955	5.29	0.7236
	10	0.3581	10.90	0.727	62 6	4 8.4	217 11	14 28.7	1.0066	1.2962	5.19	0.7148
	11	0.3608	+11.00	+0.733	61 50	4 7.3	216 14	14 24.9	+1.0067	+1.2968	−5.08	−0.7058
	12	0.3635	11.06	0.737	61 40	4 6.7	215 18	14 21.2	1.0069	1.2974	4.97	0.6966
	13	0.3663	11.11	0.741	61 35	4 6.3	214 21	14 17.4	1.0076	1.2979	4.86	0.6869
	14	0.3690	11.16	0.744	61 33	4 6.2	213 25	14 13.7	1.0091	1.2985	4.75	0.6769
	15	0.3718	11.23	0.748	61 31	4 6.1	212 29	14 9.9	1.0112	1.2991	4.64	0.6666
	16	0.3745	+11.33	+0.755	61 27	4 5.8	211 33	14 6.2	+1.0140	+1.2997	−4.53	−0.6558
	17	0.3773	+11.46	+0.764	61 18	4 5.2	210 38	14 2.5	+1.0172	+1.3003	−4.41	−0.6448

FOR WASHINGTON MEAN MIDNIGHT.

Solar Day. (Sid. Hour.)		τ	f In Arc.	f In Time.	G In Arc.	G In Time.	H In Arc.	H In Time.	Log g.	Log h.	i	Log i.
		y	″	s	° ′	h m	° ′	h m			″	
May	17	0.3773	+11.46	+0.764	61 18	4 5.2	210 38	14 2.5	+1.0172	+1.3002	−4.41	−0.6448
	18	0.3800	11.63	0.775	61 5	4 4.3	209 42	13 58.8	1.0204	1.3008	4.30	0.6332
	19	0.3827	11.83	0.788	60 46	4 3.1	208 47	13 55.1	1.0234	1.3013	4.18	0.6213
	20	0.3855	12.03	0.802	60 24	4 1.6	207 52	13 51.5	1.0258	1.3018	4.07	0.6089
	21	0.3882	12.23	0.815	59 59	3 59.9	206 57	13 47.8	1.0276	1.3024	3.94	0.5960
(16.0 h)	22	0.3909	+12.41	+0.827	59 35	3 58.3	206 2	13 44.1	+1.0286	+1.3029	−3.82	−0.5826
	23	0.3937	12.55	0.837	59 14	3 56.9	205 7	13 40.5	1.0289	1.3033	3.70	0.5686
	24	0.3964	12.66	0.844	58 56	3 55.7	204 13	13 36.9	1.0289	1.3038	3.58	0.5541
	25	0.3992	12.73	0.849	58 44	3 54.9	203 18	13 33.2	1.0289	1.3043	3.46	0.5389
	26	0.4019	12.78	0.852	58 37	3 54.5	202 24	13 29.6	1.0290	1.3047	3.34	0.5231
	27	0.4046	+12.82	+0.854	58 34	3 54.3	201 30	13 26.0	+1.0297	+1.3052	−3.21	−0.5065
	28	0.4074	12.87	0.858	58 33	3 54.2	200 36	13 22.4	1.0312	1.3056	3.08	0.4892
	29	0.4101	12.95	0.863	58 30	3 54.0	199 42	13 18.8	1.0333	1.3060	2.96	0.4710
	30	0.4129	13.07	0.871	58 24	3 53.6	198 48	13 15.2	1.0360	1.3064	2.83	0.4519
	31	0.4156	13.23	0.882	58 13	3 52.9	197 54	13 11.6	1.0391	1.3067	2.70	0.4318
June	1	0.4183	+13.43	+0.895	57 57	3 51.8	197 1	13 8.1	+1.0423	+1.3071	−2.57	−0.4105
	2	0.4211	13.65	0.910	57 35	3 50.3	196 7	13 4.5	1.0451	1.3075	2.44	0.3881
	3	0.4238	13.89	0.926	57 9	3 48.6	195 14	13 0.9	1.0475	1.3078	2.31	0.3644
	4	0.4265	14.12	0.941	56 42	3 46.8	194 21	12 57.4	1.0492	1.3081	2.18	0.3391
	5	0.4293	14.32	0.955	56 14	3 44.9	193 27	12 53.8	1.0502	1.3084	2.05	0.3122
(17.0 h)	6	0.4320	+14.49	+0.966	55 50	3 43.3	192 34	12 50.3	+1.0507	+1.3087	−1.92	−0.2833
	7	0.4348	14.62	0.975	55 29	3 41.9	191 41	12 46.7	1.0509	1.3089	1.79	0.2524
	8	0.4375	14.72	0.981	55 14	3 40.9	190 48	12 43.2	1.0511	1.3091	1.66	0.2188
	9	0.4402	14.80	0.987	55 4	3 40.3	189 55	12 39.7	1.0515	1.3094	1.52	0.1823
	10	0.4430	14.87	0.991	54 58	3 39.9	189 2	12 36.1	1.0525	1.3096	1.40	0.1425
	11	0.4457	+14.96	+0.997	54 53	3 39.5	188 9	12 32.6	+1.0541	+1.3098	−1.26	−0.0992
	12	0.4484	15.07	1.005	54 48	3 39.2	187 17	12 29.1	1.0564	1.3099	1.12	0.0500
	13	0.4512	15.21	1.014	54 40	3 38.7	186 24	12 25.6	1.0591	1.3101	0.99	9.9946
	14	0.4539	15.39	1.026	54 28	3 37.9	185 31	12 22.1	1.0619	1.3102	0.85	9.9309
	15	0.4567	15.60	1.040	54 10	3 36.7	184 39	12 18.6	1.0648	1.3103	0.72	9.8560
	16	0.4594	+15.83	+1.055	53 49	3 35.3	183 46	12 15.1	+1.0672	+1.3104	−0.58	−9.7637
	17	0.4621	16.05	1.070	53 24	3 33.6	182 54	12 11.6	1.0691	1.3105	0.45	9.6508
	18	0.4649	16.25	1.083	52 59	3 31.9	182 1	12 8.1	1.0702	1.3105	0.31	9.4943
	19	0.4676	16.42	1.094	52 35	3 30.3	181 8	12 4.5	1.0707	1.3106	0.18	9.2470
	20	0.4703	16.56	1.104	52 14	3 28.9	180 16	12 1.1	1.0708	1.3106	−0.04	−8.6031
(18.0 h)	21	0.4731	+16.65	+1.110	51 57	3 27.8	179 23	11 57.5	+1.0706	+1.3106	+0.09	+8.9750
	22	0.4758	16.72	1.115	51 45	3 27.0	178 31	11 54.1	1.0705	1.3106	0.23	9.3615
	23	0.4786	16.77	1.118	51 38	3 26.5	177 38	11 50.5	1.0707	1.3105	0.37	9.5626
	24	0.4813	16.83	1.122	51 34	3 26.3	176 46	11 47.1	1.0715	1.3105	0.50	9.6994
	25	0.4840	16.91	1.127	51 30	3 26.0	175 53	11 43.5	1.0729	1.3104	0.64	9.8031
	26	0.4868	+17.02	+1.135	51 24	3 25.6	175 1	11 40.1	+1.0749	+1.3103	+0.77	+9.8867
	27	0.4895	17.18	1.145	51 15	3 25.0	174 8	11 36.5	1.0774	1.3102	0.91	9.9567
	28	0.4922	17.37	1.158	51 1	3 24.1	173 16	11 33.1	1.0801	1.3100	1.04	0.0169
	29	0.4950	17.59	1.173	50 42	3 22.8	172 23	11 29.5	1.0826	1.3099	1.17	0.0696
	30	0.4977	17.83	1.189	50 18	3 21.2	171 30	11 26.0	1.0849	1.3097	1.31	0.1165
	31	0.5005	+18.07	+1.205	49 52	3 19.5	170 38	11 22.5	+1.0866	+1.3095	+1.44	+0.1587
	32	0.5032	+18.28	+1.219	49 25	3 17.7	169 45	11 19.0	+1.0877	+1.3093	+1.57	+0.1970

FOR WASHINGTON MEAN MIDNIGHT.

Solar Day. (Sid. Hour.)	τ	f In Arc.	f In Time.	G In Arc.	G In Time.	H In Arc.	H In Time.	Log g.	Log h.	i	Log i.
	y	"	s	° ′	h m	° ′	h m			"	
July 1	0.5005	+18.07	+1.205	49 52	3 19.5	170 38	11 22.5	+1.0866	+1.3095	+1.41	+0.1587
2	0.5032	18.28	1.219	49 25	3 17.7	169 45	11 19.0	1.0877	1.3093	1.57	0.1970
3	0.5059	18.47	1.231	48 59	3 15.9	168 52	11 15.5	1.0882	1.3091	1.71	0.2321
4	0.5087	18.61	1.241	48 36	3 14.4	167 59	11 11.9	1.0883	1.3088	1.84	0.2646
5	0.5114	18.72	1.248	48 18	3 13.2	167 6	11 8.4	1.0883	1.3086	1.97	0.2946
(19.0h) 6	0.5142	+18.80	+1.253	48 5	3 12.3	166 14	11 4.9	+1.0883	+1.3083	+2.10	+0.3226
7	0.5169	18.87	1.258	47 56	3 11.7	165 20	11 1.3	1.0887	1.3080	2.23	0.3487
8	0.5196	18.95	1.263	47 50	3 11.3	164 27	10 57.8	1.0896	1.3077	2.36	0.3733
9	0.5224	19.04	1.269	47 45	3 11.0	163 34	10 54.3	1.0909	1.3073	2.49	0.3964
10	0.5251	19.17	1.278	47 38	3 10.5	162 41	10 50.7	1.0929	1.3070	2.62	0.4183
11	0.5278	+19.33	+1.289	47 29	3 9.9	161 47	10 47.1	+1.0953	+1.3066	+2.75	+0.4392
12	0.5306	19.53	1.302	47 14	3 8.9	160 54	10 43.6	1.0977	1.3063	2.88	0.4588
13	0.5333	19.74	1.316	46 56	3 7.7	160 0	10 40.0	1.0999	1.3059	3.00	0.4774
14	0.5361	19.95	1.330	46 34	3 6.3	159 6	10 36.4	1.1016	1.3055	3.13	0.4951
15	0.5388	20.15	1.343	46 10	3 4.7	158 13	10 32.9	1.1028	1.3050	3.25	0.5122
16	0.5415	+20.32	+1.355	45 46	3 3.1	157 19	10 29.3	+1.1033	+1.3046	+3.38	+0.5284
17	0.5443	20.46	1.364	45 24	3 1.6	156 25	10 25.7	1.1035	1.3041	3.50	0.5438
18	0.5470	20.55	1.370	45 6	3 0.4	155 30	10 22.0	1.1029	1.3037	3.62	0.5587
19	0.5497	20.61	1.374	44 52	2 59.5	154 36	10 18.4	1.1024	1.3032	3.74	0.5730
20	0.5525	20.65	1.376	44 43	2 58.9	153 41	10 14.7	1.1021	1.3027	3.86	0.5867
21	0.5552	+20.68	+1.379	44 37	2 58.5	152 47	10 11.1	+1.1021	+1.3022	+3.98	+0.5998
(20.0h) 22	0.5580	20.73	1.382	44 34	2 58.3	151 52	10 7.5	1.1028	1.3017	4.10	0.6125
23	0.5607	20.81	1.387	44 30	2 58.0	150 57	10 3.8	1.1040	1.3012	4.21	0.6247
24	0.5634	20.93	1.395	44 24	2 57.6	150 2	10 0.1	1.1058	1.3006	4.33	0.6364
25	0.5662	21.09	1.406	44 14	2 56.9	149 7	9 56.5	1.1078	1.3001	4.44	0.6477
26	0.5689	+21.28	+1.419	44 0	2 56.0	148 12	9 52.8	+1.1100	+1.2995	+4.56	+0.6587
27	0.5716	21.50	1.433	43 41	2 54.7	147 17	9 49.1	1.1120	1.2990	4.67	0.6692
28	0.5744	21.71	1.447	43 18	2 53.2	146 21	9 45.4	1.1136	1.2984	4.78	0.6794
29	0.5771	21.91	1.461	42 54	2 51.6	145 25	9 41.7	1.1147	1.2978	4.89	0.6892
30	0.5799	22.08	1.472	42 29	2 49.9	144 29	9 37.9	1.1152	1.2972	5.00	0.6987
31	0.5826	+22.21	+1.481	42 7	2 48.5	143 33	9 34.2	+1.1152	+1.2966	+5.10	+0.7079
Aug. 1	0.5853	22.30	1.487	41 49	2 47.3	142 37	9 30.5	1.1149	1.2960	5.21	0.7168
2	0.5881	22.37	1.491	41 35	2 46.3	141 41	9 26.7	1.1146	1.2954	5.31	0.7253
3	0.5908	22.41	1.494	41 27	2 45.8	140 44	9 22.9	1.1145	1.2948	5.42	0.7336
4	0.5936	22.45	1.497	41 21	2 45.4	139 47	9 19.1	1.1147	1.2942	5.52	0.7416
5	0.5963	+22.51	+1.501	41 19	2 45.3	138 50	9 15.3	+1.1155	+1.2936	+5.62	+0.7494
(21.0h) 6	0.5990	22.60	1.507	41 15	2 45.0	137 53	9 11.5	1.1168	1.2929	5.71	0.7568
7	0.6018	22.72	1.515	41 9	2 44.6	136 56	9 7.7	1.1185	1.2923	5.81	0.7641
8	0.6045	22.88	1.525	41 0	2 44.0	135 59	9 3.9	1.1205	1.2917	5.90	0.7711
9	0.6072	23.05	1.537	40 47	2 43.1	135 1	9 0.1	1.1224	1.2911	6.00	0.7779
10	0.6100	+23.24	+1.549	40 30	2 42.0	134 3	8 56.2	+1.1240	+1.2904	+6.09	+0.7845
11	0.6127	23.41	1.561	40 10	2 40.7	133 5	8 52.3	1.1251	1.2898	6.18	0.7908
12	0.6155	23.56	1.571	39 49	2 39.3	132 6	8 48.4	1.1257	1.2892	6.26	0.7969
13	0.6182	23.68	1.578	39 29	2 37.9	131 8	8 44.5	1.1257	1.2885	6.35	0.8029
14	0.6209	23.75	1.583	39 12	2 36.8	130 9	8 40.6	1.1252	1.2879	6.44	0.8086
15	0.6237	+23.78	+1.585	38 58	2 35.9	129 10	8 36.7	+1.1245	+1.2873	+6.52	+0.8142
16	0.6264	+23.79	+1.586	38 50	2 35.3	128 11	8 32.7	+1.1238	+1.2867	+6.60	+0.8195

FOR WASHINGTON MEAN MIDNIGHT.

…dar Day. (…d. Hour.)	τ	*f* In Arc.	*f* In Time.	*G* In Arc.	*G* In Time.	*H* In Arc.	*H* In Time.	Log *g*.	Log *h*.	*i*	Log *i*.
	y	"	s	° '	h m	° '	h m			"	
…ct 1	0.7524	+27.34	+1.823	33 46	2 15.1	80 17	5 21.1	+1.1560	+1.2741	+8.04	+0.9053
2	0.7551	27.47	1.831	33 45	2 15.0	79 13	5 16.9	1.1579	1.2743	8.02	0.9040
3	0.7578	27.62	1.841	33 40	2 14.7	78 9	5 12.6	1.1599	1.2746	7.99	0.9027
4	0.7606	27.78	1.852	33 31	2 14.1	77 4	5 8.3	1.1616	1.2749	7.96	0.9011
5	0.7633	27.92	1.861	33 20	2 13.3	76 0	5 4.0	1.1628	1.2752	7.93	0.8995
(1^h.0) 6	0.7660	+28.03	+1.869	33 8	2 12.5	74 56	4 59.7	+1.1636	+1.2755	+7.90	+0.8977
7	0.7688	28.10	1.873	32 57	2 11.8	73 53	4 55.5	1.1638	1.2758	7.87	0.8958
8	0.7715	28.14	1.876	32 49	2 11.3	72 49	4 51.3	1.1637	1.2762	7.83	0.8937
9	0.7743	28.14	1.876	32 44	2 10.9	71 45	4 47.0	1.1634	1.2765	7.79	0.8915
10	0.7770	28.13	1.875	32 44	2 10.9	70 41	4 42.7	1.1632	1.2769	7.75	0.8892
11	0.7797	+28.11	+1.874	32 48	2 11.2	69 38	4 38.5	+1.1632	+1.2773	+7.70	+0.8867
12	0.7825	28.11	1.874	32 54	2 11.6	68 34	4 34.3	1.1637	1.2778	7.66	0.8841
13	0.7852	28.15	1.877	33 1	2 12.1	67 31	4 30.1	1.1648	1.2782	7.61	0.8813
14	0.7879	28.22	1.881	33 6	2 12.4	66 28	4 25.9	1.1664	1.2787	7.56	0.8784
15	0.7907	28.34	1.889	33 9	2 12.6	65 24	4 21.6	1.1685	1.2792	7.50	0.8753
16	0.7934	+28.49	+1.899	33 8	2 12.5	64 21	4 17.4	+1.1707	+1.2797	+7.45	+0.8721
17	0.7962	28.66	1.911	33 2	2 12.1	63 18	4 13.2	1.1728	1.2802	7.39	0.8686
18	0.7989	28.84	1.923	32 53	2 11.5	62 16	4 9.1	1.1748	1.2807	7.33	0.8651
19	0.8016	29.01	1.934	32 41	2 10.7	61 13	4 4.9	1.1763	1.2813	7.27	0.8614
20	0.8044	29.14	1.943	32 29	2 9.9	60 10	4 0.7	1.1773	1.2818	7.20	0.8575
(2^h.0) 21	0.8071	+29.24	+1.949	32 18	2 9.2	59 8	3 56.5	+1.1780	+1.2824	+7.13	+0.8534
22	0.8098	29.31	1.954	32 10	2 8.7	58 5	3 52.3	1.1783	1.2829	7.07	0.8492
23	0.8126	29.34	1.956	32 7	2 8.5	57 3	3 48.2	1.1785	1.2835	6.99	0.8448
24	0.8153	29.37	1.958	32 7	2 8.5	56 1	3 44.1	1.1789	1.2842	6.92	0.8402
25	0.8181	29.39	1.959	32 10	2 8.7	54 59	3 39.9	1.1796	1.2848	6.85	0.8354
26	0.8208	+29.44	+1.963	32 16	2 9.1	53 57	3 35.8	+1.1807	+1.2854	+6.77	+0.8305
27	0.8235	29.52	1.968	32 22	2 9.5	52 55	3 31.7	1.1824	1.2860	6.69	0.8253
28	0.8263	29.63	1.975	32 26	2 9.7	51 54	3 27.6	1.1844	1.2866	6.61	0.8200
29	0.8290	29.78	1.985	32 28	2 9.9	50 53	3 23.5	1.1867	1.2873	6.52	0.8144
30	0.8318	29.96	1.997	32 25	2 9.7	49 51	3 19.4	1.1890	1.2879	6.44	0.8087
31	0.8345	+30.14	+2.009	32 19	2 9.3	48 50	3 15.3	+1.1912	+1.2886	+6.35	+0.8027
…ov. 1	0.8372	30.32	2.021	32 10	2 8.7	47 49	3 11.3	1.1930	1.2892	6.26	0.7963
2	0.8400	30.47	2.032	31 59	2 7.9	46 49	3 7.3	1.1944	1.2899	6.17	0.7901
3	0.8427	30.59	2.039	31 49	2 7.3	45 48	3 3.2	1.1953	1.2905	6.07	0.7834
4	0.8454	30.67	2.045	31 40	2 6.7	44 47	2 59.1	1.1957	1.2912	5.98	0.7765
(3^h.0) 5	0.8482	+30.72	+2.048	31 35	2 6.3	43 47	2 55.1	+1.1960	+1.2918	+5.88	+0.7693
6	0.8509	30.74	2.049	31 34	2 6.3	42 47	2 51.1	1.1962	1.2925	5.78	0.7619
7	0.8537	30.76	2.050	31 36	2 6.4	41 47	2 47.1	1.1966	1.2932	5.68	0.7542
8	0.8564	30.78	2.052	31 41	2 6.7	40 47	2 43.1	1.1973	1.2938	5.58	0.7463
9	0.8591	30.84	2.056	31 47	2 7.1	39 47	2 39.1	1.1986	1.2945	5.47	0.7380
10	0.8619	+30.94	+2.062	31 52	2 7.5	38 48	2 35.2	+1.2004	+1.2951	+5.36	+0.7295
11	0.8646	31.08	2.072	31 55	2 7.7	37 48	2 31.2	1.2026	1.2958	5.26	0.7206
12	0.8673	31.26	2.084	31 55	2 7.7	36 49	2 27.3	1.2050	1.2964	5.15	0.7114
13	0.8701	31.46	2.097	31 50	2 7.3	35 50	2 23.3	1.2075	1.2970	5.03	0.7019
14	0.8728	31.67	2.111	31 42	2 6.8	34 51	2 19.4	1.2098	1.2976	4.92	0.6919
15	0.8756	+31.88	+2.125	31 31	2 6.1	33 52	2 15.5	+1.2118	+1.2983	+4.81	+0.6817
16	0.8783	+32.07	+2.138	31 18	2 5.2	32 53	2 11.5	+1.2133	+1.2989	+4.60	+0.6710

* *Apparent right ascensions of stars marked with an asterisk are given after those of standard stars.*

* Apparent right ascensions of stars marked with an asterisk are given after those of standard stars.

* of stars marked with an asterisk are given after those of standard stars.

† Periodic corrections given in the Appendix are still to be applied to the positions of Sirius and Procyon.

* *Apparent* right ascensions of stars marked with an asterisk are given after those of standard stars.

* *Apparent right ascensions of stars marked with an asterisk are given after those of standard stars.*

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* Apparent right ascensions of stars marked with an asterisk are given after those of standard stars.

CIRCUMPOLAR STARS.

APPARENT PLACES FOR THE UPPER TRANSIT AT WASHINGTON.

Mean Solar Date.	α Ursæ Minoris. (*Polaris.*) Right Ascension.	Declination North.	Mean Solar Date.	51 Cephei (Hev.) Right Ascension.	Declination North.	Mean Solar Date.	δ Ursæ Minoris. Right Ascension.	Declination North.	Mean Solar Date.	λ Ursæ Minoris. Right Ascension.	Declination North.
	h m	° ′		h m	° ′		h m	° ′		h m	° ′
Jan.	1 17	+88 42	Jan.	6 47	+87 13	Jan.	18 8	+86 36	Jan.	19 36	+88 57
	s	″		s	″		s	″		s	″
0.3	35.02	18.6	0.5	9.43	11.2	1.0	44.17	45.3	1.0	57.82	41.3
1.3	34.21	18.7	1.5	9.54	11.5	2.0	44.15	45.0	2.0	57.35	41.1
2.3	33.39	18.9	2.5	9.66	11.8	3.0	44.13	44.7	3.0	56.83	40.8
3.3	32.53	19.0	3.5	9.78	12.1	4.0	44.12	44.3	4.0	56.31	40.5
4.3	31.62	19.1	4.5	9.90	12.5	5.0	44.12	44.0	5.0	55.78	40.2
5.3	30.63	19.2	5.5	10.01	12.8	6.0	44.14	43.6	6.0	55.31	39.8
6.3	29.62	19.3	6.5	10.08	13.2	7.0	44.18	43.2	7.0	54.89	39.5
7.3	28.55	19.4	7.5	10.12	13.5	8.0	44.24	42.9	8.0	54.57	39.1
8.2	27.46	19.4	8.5	10.13	13.9	9.0	44.32	42.5	9.0	54.31	38.7
9.2	26.39	19.5	9.5	10.10	14.2	9.9	44.42	42.1	10.0	54.14	38.4
10.2	25.34	19.5	10.5	10.06	14.6	10.9	44.53	41.8	11.0	54.02	38.0
11.2	24.35	19.5	11.5	10.00	14.9	11.9	44.64	41.5	12.0	53.94	37.7
12.2	23.42	19.5	12.5	9.95	15.2	12.9	44.76	41.2	13.0	53.85	37.4
13.2	22.54	19.5	13.5	9.90	15.5	13.9	44.86	40.9	14.0	53.74	37.1
14.2	21.69	19.5	14.5	9.88	15.8	14.9	44.94	40.6	15.0	53.52	36.8
15.2	20.84	19.5	15.5	9.86	16.1	15.9	45.02	40.3	16.0	53.40	36.5
16.2	[illegible]	19.5	16.5	9.88	16.4	16.9	45.09	40.0	17.0	53.19	36.2
17.2	19.06	19.5	17.5	9.87	16.7	17.9	45.17	39.7	18.0	52.97	35.9
18.2	18.12	19.6	18.5	9.88	17.0	18.9	45.27	39.4	19.0	52.77	35.6
19.2	17.13	19.6	19.5	9.87	17.3	19.9	45.37	39.0	20.0	52.59	35.2
20.2	16.19	19.6	20.4	9.82	17.7	20.9	45.50	38.6	21.0	52.47	34.8
21.2	15.12	19.6	21.4	9.76	18.0	21.9	45.65	38.3	22.0	52.45	34.5
22.2	[illegible]	19.6	22.4	9.65	18.4	22.9	45.82	37.9	23.0	52.52	34.1
23.2	12.88	19.5	23.4	9.51	18.7	23.9	46.01	37.6	24.0	52.67	33.8
24.2	[illegible]	[illegible]	24.4	9.35	[illegible]	24.9	46.22	37.3	25.0	[illegible]	33.4
25.2	[illegible]	19.4	25.4	[illegible]	19.4	25.9	46.42	37.1	26.0	53.10	[illegible]
26.2	[illegible]	19.3	26.4	[illegible]	19.6	26.9	46.62	36.8	27.0	53.34	[illegible]
27.2	[illegible]	19.2	27.4	8.86	[illegible]	27.9	46.84	36.5	28.0	53.55	[illegible]
28.2	[illegible]	[illegible]	28.4	[illegible]	20.2	28.9	[illegible]	36.3	29.0	53.72	[illegible]
29.2	[illegible]	[illegible]	29.4	[illegible]	[illegible]	29.9	[illegible]	36.0	30.0	53.56	[illegible]
30.2	[illegible]	[illegible]	30.4	[illegible]	[illegible]	30.9	47.34	35.7	31.0	[illegible]	[illegible]
31.2	[illegible]	[illegible]	31.4	[illegible]	[illegible]	31.9	47.53	35.5	32.0	[illegible]	[illegible]
32.2	[illegible]	[illegible]	32.4	[illegible]	[illegible]	32.9	47.73	35.2			

CIRCUMPOLAR STARS.

APPARENT PLACES FOR THE UPPER TRANSIT AT WASHINGTON.

Mean Solar Date.	α Ursæ Minoris. (*Polaris.*) Right Ascension.	Declination *North.*	Mean Solar Date.	51 Cephei (Hev.) Right Ascension.	Declination *North.*	Mean Solar Date.	δ Ursæ Minoris. Right Ascension.	Declination *North.*	Mean Solar Date.	λ Ursæ Minori[s.] Right Ascension.	Decli[na]tio[n] *Nor[th.]*
Mar.	h m 1 16	° ′ +88 42	Mar.	h m 6 46	° ′ +87 13	Mar.	h m 18 8	° ′ +86 36	Mar.	h m 19 37	+88
	s	″		s	″		s	″		s	
1.1	42.79	13.9	1.3	60.22	28.0	1.8	55.81	29.4	1.9	10.52	
2.1	42.09	13.6	2.3	59.86	28.2	2.8	56.15	29.2	2.9	11.32	
3.1	41.37	13.4	3.3	59.48	28.4	3.8	56.52	29.0	3.9	12.21	
4.1	40.66	13.1	4.3	59.07	28.6	4.8	56.90	28.9	4.9	13.17	
5.1	39.98	12.8	5.3	58.67	28.8	5.8	57.29	28.8	5.9	14.18	
6.1	39.36	12.5	6.3	58.18	29.0	6.8	57.68	28.7	6.9	15.23	
7.1	38.81	12.2	7.3	57.72	29.1	7.8	58.06	28.6	7.9	16.29	
8.1	38.32	11.9	8.3	57.28	29.2	8.8	58.44	28.5	8.9	17.34	
9.1	37.90	11.6	9.3	56.85	29.3	9.8	58.81	28.5	9.9	18.36	
10.1	37.52	11.3	10.3	56.44	29.4	10.8	59.16	28.5	10.8	19.34	
11.1	37.16	11.0	11.3	56.05	29.5	11.8	59.49	28.4	11.8	20.26	
12.1	36.81	10.8	12.3	55.70	29.6	12.8	59.81	28.4	12.8	21.15	
13.1	36.44	10.5	13.3	55.33	29.7	13.8	60.14	28.3	13.8	22.02	
14.1	36.03	10.3	14.3	54.98	29.8	14.8	60.46	28.2	14.8	22.89	
15.1	35.58	10.0	15.3	54.62	29.9	15.8	60.80	28.1	15.8	23.79	
16.1	35.10	9.8	16.3	54.24	30.0	16.8	61.16	28.1	16.8	24.76	
17.1	34.62	9.5	17.3	53.82	30.2	17.8	61.54	28.0	17.8	25.79	
18.1	34.15	9.2	18.3	53.38	30.3	18.8	61.93	27.9	18.8	26.90	
19.1	33.73	8.9	19.3	52.91	30.4	19.8	62.33	27.9	19.8	28.07	
20.1	33.37	8.5	20.3	52.43	30.5	20.8	62.72	27.9	20.8	29.27	
21.1	33.07	8.2	21.3	51.95	30.5	21.8	63.11	27.9	21.8	30.48	
22.1	32.85	7.9	22.3	51.48	30.5	22.8	63.50	28.0	22.8	31.66	
23.1	32.69	7.5	23.3	51.04	30.5	23.8	63.87	28.0	23.8	32.81	
24.0	32.57	7.2	24.3	50.61	30.5	24.7	64.22	28.1	24.8	33.90	
25.0	32.45	6.9	25.3	50.21	30.6	25.7	64.56	28.1	25.8	34.95	
26.0	32.32	6.6	26.3	49.81	30.6	26.7	64.89	28.1	26.8	35.97	
27.0	32.16	6.3	27.3	49.44	30.6	27.7	65.23	28.2	27.8	36.98	
28.0	31.97	6.1	28.3	49.04	30.6	28.7	65.57	28.2	28.8	38.01	
29.0	31.74	5.8	29.3	48.64	30.7	29.7	65.92	28.2	29.8	39.08	
30.0	31.49	5.5	30.3	48.21	30.7	30.7	66.30	28.2	30.8	40.21	
31.0	31.24	5.1	31.3	47.76	30.8	31.7	66.68	28.2	31.8	41.40	
32.0	31.02	4.8	32.3	47.28	30.8	32.7	67.07	28.2	32.8	42.65	

CIRCUMPOLAR STARS.

APPARENT PLACES FOR THE UPPER TRANSIT AT WASHINGTON.

Mean Solar Date.	α Ursæ Minoris. (*Polaris.*) Right Ascension.	α Ursæ Minoris. (*Polaris.*) Declination *North.*	Mean Solar Date.	51 Cephei (Hev.) Right Ascension.	51 Cephei (Hev.) Declination *North.*	Mean Solar Date.	δ Ursæ Minoris. Right Ascension.	δ Ursæ Minoris. Declination *North.*	Mean Solar Date.	λ Ursæ Minoris. Right Ascension.	λ Ursæ Minoris. Declination *North.*
	h m	° ′		h m	° ′		h m	° ′		h m	° ′
Apr.	1 16	+88 41	Apr.	6 46	+87 13	Apr.	18 9	+86 36	Apr.	19 37	+88 57
	s	″		s	″		s	″		s	″
1.0	31.02	64.8	1.3	47.28	30.8	1.7	7.07	28.2	1.8	42.65	18.3
2.0	30.85	64.5	2.3	46.79	30.8	2.7	7.46	28.3	2.8	43.93	18.2
3.0	30.74	64.1	3.2	46.29	30.8	3.7	7.86	28.4	3.8	45.22	18.1
4.0	30.71	63.8	4.2	45.81	30.7	4.7	8.25	28.5	4.8	46.50	18.1
5.0	30.75	63.4	5.2	45.33	30.7	5.7	8.60	28.6	5.8	47.75	18.1
6.0	30.84	63.1	6.2	44.89	30.6	6.7	8.93	28.8	6.8	48.93	18.1
7.0	30.97	62.7	7.2	44.47	30.5	7.7	9.26	28.9	7.8	50.06	18.1
8.0	31.10	62.5	8.2	44.09	30.5	8.7	9.57	29.0	8.8	51.13	18.2
9.0	31.22	62.2	9.2	43.72	30.4	9.7	9.86	29.1	9.8	52.15	18.2
10.0	31.31	61.9	10.2	43.35	30.3	10.7	10.16	29.2	10.8	53.16	18.2
11.0	31.37	61.6	11.2	42.99	30.3	11.7	10.47	29.3	11.8	54.18	18.1
12.0	31.40	61.4	12.2	42.62	30.3	12.7	10.79	29.4	12.8	55.25	18.1
13.0	31.41	61.1	13.2	42.22	30.2	13.7	11.13	29.5	13.8	56.36	18.1
14.0	31.43	60.7	14.2	41.80	30.2	14.7	11.47	29.6	14.8	57.53	18.1
15.0	31.48	60.4	15.2	41.37	30.1	15.7	11.82	29.7	15.8	58.76	18.1
16.0	31.58	60.1	16.2	40.91	30.0	16.7	12.17	29.9	16.7	60.03	18.1
17.0	31.75	59.7	17.2	40.46	29.9	17.7	12.51	30.1	17.7	61.29	18.1
18.0	31.99	59.4	18.2	40.02	29.8	18.7	12.84	30.3	18.7	62.54	18.2
19.0	32.30	59.1	19.2	39.59	29.7	19.7	13.16	30.5	19.7	63.76	18.3
20.0	32.65	58.8	20.2	39.19	29.5	20.7	13.46	30.7	20.7	64.91	18.4
21.0	33.02	58.5	21.2	38.83	29.3	21.7	13.74	30.9	21.7	65.99	18.5
22.0	33.39	58.2	22.2	38.47	29.2	22.7	14.00	31.1	22.7	67.01	18.6
23.0	33.73	57.9	23.2	38.13	29.0	23.7	14.26	31.2	23.7	68.02	18.7
24.0	34.04	57.7	24.2	37.80	28.9	24.7	14.53	31.4	24.7	69.02	18.7
25.0	34.31	57.4	25.2	37.47	28.8	25.7	14.80	31.6	25.7	70.03	18.8
26.0	34.56	57.1	26.2	37.12	28.7	26.7	15.08	31.7	26.7	71.08	18.8
27.0	34.78	56.9	27.2	36.74	28.6	27.7	15.38	31.9	27.7	72.18	18.9
28.0	35.02	56.6	28.2	36.35	28.5	28.7	15.68	32.1	28.7	73.35	18.9
28.9	35.30	56.3	29.2	35.94	28.3	29.7	15.99	32.3	29.7	74.55	19.0
29.9	35.64	55.9	30.2	35.53	28.2	30.6	16.29	32.5	30.7	75.76	19.1
30.9	36.05	55.6	31.2	35.12	28.0	31.6	16.58	32.8	31.7	76.95	19.3
31.9	36.53	55.3									

CIRCUMPOLAR STARS.

APPARENT PLACES FOR THE UPPER TRANSIT AT WASHINGTON.

Mean Solar Date.	α Ursæ Minoris. (*Polaris.*) Right Ascension.	Declination *North.*	Mean Solar Date.	51 Cephei (Hev Right Ascension.	Declination *North.*
May	h m 1 16	+88° 41′	May	h m 6 46	+87° 1
	s	″		s	″
1.9	36.53	55.3	1.2	35.12	28.
2.9	37.08	55.0	2.2	34.73	27.
3.9	37.66	54.7	3.2	34.37	27.
4.9	38.24	54.5	4.2	34.04	27.
5.9	38.82	54.3	5.2	33.74	27.
6.9	39.39	54.1	6.2	33.48	26.
7.9	39.91	53.8	7.2	33.23	[illegible]
8.9	40.39	53.6	8.2	32.98	26.
9.9	40.84	53.4	9.1	32.72	26.
10.9	41.29	53.2	10.1	32.45	26.
11.9	41.76	52.9	11.1	32.16	26.
12.9	42.27	52.7	12.1	31.86	25.
13.9	42.84	52.4	13.1	31.54	25.
14.9	43.48	52.2	14.1	31.22	25.
15.9	44.18	51.9	15.1	30.91	25.
16.9	44.92	51.7	16.1	30.62	24.
17.9	45.68	51.5	17.1	30.36	24.
18.9	46.46	51.2	18.1	30.13	24.
19.9	47.21	51.1	19.1	29.92	24.
20.9	47.93	50.9	20.1	29.73	23.
21.9	48.60	50.7	21.1	29.56	23.
22.9	49.23	50.6	22.1	29.39	23.
23.9	49.84	50.4	23.1	29.20	23.
24.9	50.44	50.2	24.1	29.00	22.
25.9	51.06	50.0	25.1	28.78	22.
26.9	51.73	49.8	26.1	28.55	22.
27.9	52.46	49.6	27.1	28.30	22.
28.9	53.27	49.4	28.1	28.06	21.
29.9	54.13	49.2	29.1	27.85	21.
30.9	55.03	49.0	30.1	27.64	21.
31.9	55.95	48.9	31.1	27.49	20.
32.9	56.86	48.8	32.1	27.36	20.

CIRCUMPOLAR STARS.

APPARENT PLACES FOR THE UPPER TRANSIT AT WASHINGTON.

Mean Solar Date.	α Ursæ Minoris. (*Polaris.*) Right Ascension.	α Ursæ Minoris. (*Polaris.*) Declination *North.*	Mean Solar Date.	51 Cephei (Hev.) Right Ascension.	51 Cephei (Hev.) Declination *North.*	Mean Solar Date.	δ Ursæ Minoris. Right Ascension.	δ Ursæ Minoris. Declination *North.*	Mean Solar Date.	λ Ursæ Minori Right Ascension.	λ Ursæ Minori Declin tion North
July	h m 1 17	+88° 41′	July	h m 6 46	+87° 13′	July	h m 18 9	+86° 36′	July	h m 19 38	+88
	s	″		s	″		s	″		s	″
1.8	23.92	47.1	1.0	26.72	11.5	1.5	21.09	50.9	1.5	53.84	34.
2.8	24.81	47.2	2.0	26.88	11.2	2.5	20.94	51.2	2.5	53.74	34.
3.8	25.66	47.2	3.0	27.03	10.9	3.5	20.80	51.4	3.5	53.66	35.
4.8	26.51	47.3	4.0	27.15	10.7	4.5	20.67	51.7	4.5	53.61	35.
5.8	27.36	47.3	5.0	27.27	10.4	5.5	20.54	51.9	5.5	53.60	35.
6.8	28.23	47.3	6.0	27.37	10.1	6.5	20.42	52.2	6.5	53.64	35.
7.8	29.16	47.4	7.0	27.46	9.8	7.5	20.31	52.5	7.5	53.70	36.
8.8	30.16	47.4	8.0	27.54	9.5	8.5	20.19	52.9	8.5	53.74	36.
9.8	31.20	47.4	9.0	27.64	9.2	9.5	20.04	53.2	9.5	53.75	36.
10.7	32.26	47.5	10.0	27.77	8.9	10.5	19.88	53.5	10.5	53.70	37.
11.7	33.32	47.5	11.0	27.91	8.5	11.5	19.71	53.8	11.5	53.59	37.
12.7	34.37	47.6	12.0	28.09	8.2	12.4	19.51	54.2	12.5	53.40	38.
13.7	35.39	47.8	13.0	28.31	7.8	13.4	19.30	54.5	13.5	53.14	38.
14.7	36.35	47.9	14.0	28.53	7.5	14.4	19.08	54.8	14.5	52.82	38.
15.7	37.25	48.0	15.0	28.78	7.3	15.4	18.86	55.0	15.5	52.49	39.
16.7	38.10	48.1	16.0	29.01	7.0	16.4	18.65	55.3	16.5	52.17	39.
17.7	38.93	48.2	17.0	29.25	6.7	17.4	18.45	55.5	17.5	51.86	39.
18.7	39.74	48.3	18.0	29.45	6.5	18.4	18.25	55.8	18.5	51.57	40.
19.7	40.55	48.4	19.0	29.64	6.2	19.4	18.06	56.0	19.5	51.33	40.
20.7	41.41	48.5	20.0	29.82	5.9	20.4	17.88	56.3	20.5	51.13	40.
21.7	42.32	48.6	20.9	29.98	5.7	21.4	17.69	56.5	21.5	50.94	40.
22.7	43.28	48.7	21.9	30.15	5.4	22.4	17.49	56.8	22.5	50.72	41.
23.7	44.28	48.8	22.9	30.36	5.1	23.4	17.27	57.1	23.5	50.46	41.
24.7	45.31	48.9	23.9	30.57	4.8	24.4	17.03	57.4	24.5	50.14	41.
25.7	46.34	49.1	24.9	30.83	4.4	25.4	16.77	57.7	25.5	49.73	42.
26.7	47.35	49.3	25.9	31.11	4.1	26.4	16.48	58.0	26.5	49.24	42.
27.7	48.31	49.5	26.9	31.43	3.8	27.4	16.18	58.3	27.5	48.67	42.
28.7	49.22	49.7	27.9	31.77	3.5	28.4	15.88	58.5	28.5	48.05	43.
29.7	50.06	49.9	28.9	32.10	3.3	29.4	15.58	58.7	29.5	47.41	43.
30.7	50.87	50.1	29.9	32.45	3.0	30.4	15.28	58.9	30.5	46.78	43.
31.7	51.65	50.2	30.9	32.78	2.8	31.4	15.00	59.1	31.5	46.18	44.
32.7	52.41	50.4	31.9	33.09	2.6	32.4	14.72	59.4	32.5	45.62	44.
			32.9	33.38	2.3						

CIRCUMPOLAR STARS.

APPARENT PLACES FOR THE UPPER TRANSIT AT WASHINGTON.

α Ursæ Minoris. (*Polaris.*)		Mean Solar Date.	51 Cephei (Hev.)		Mean Solar Date.	δ Ursæ Minoris.		Mean Solar Date.	λ Ursæ Minoris.	
Right Ascension.	Declination North.		Right Ascension.	Declination North.		Right Ascension.	Declination North.		Right Ascension.	Declination North.
h m 1 17	° ′ +88 41	Aug.	h m 6 46	° ′ +87 12	Aug.	h m 18 9	° ′ +86 36	Aug.	h m 19 38	° ′ +88 57
s 52.41	″ 50.4	1.9	s 33.38	″ 62.3	1.4	s 14.72	″ 59.4	1.5	s 45.62	″ 44.4
53.19	50.6	2.9	33.67	62.1	2.4	14.45	59.6	2.5	45.10	44.7
54.01	50.8	3.9	33.94	61.8	3.4	14.18	59.8	3.5	44.61	45.0
54.88	50.9	4.9	34.21	61.6	4.4	13.92	60.0	4.4	44.14	45.3
55.80	51.1	5.9	34.51	61.3	5.4	13.65	60.3	5.4	43.64	45.6
56.75	51.3	6.9	34.83	61.0	6.4	13.35	60.5	6.4	43.10	46.0
57.71	51.5	7.9	35.18	60.7	7.4	13.04	60.8	7.4	42.49	46.3
58.66	51.7	8.9	35.56	60.4	8.4	12.71	61.0	8.4	41.81	46.6
59.58	51.9	9.9	35.94	60.2	9.4	12.37	61.3	9.4	41.06	47.0
60.44	52.2	10.9	36.37	59.9	10.4	12.02	61.5	10.4	40.25	47.3
61.23	52.5	11.9	36.77	59.7	11.4	11.66	61.7	11.4	39.41	47.6
61.96	52.7	12.9	37.19	59.5	12.4	11.31	61.8	12.4	38.57	47.9
62.65	52.9	13.9	37.56	59.3	13.4	10.97	62.0	13.4	37.74	48.1
63.31	53.2	14.9	37.92	59.1	14.4	10.64	62.1	14.4	36.95	48.4
63.97	53.4	15.9	38.27	58.9	15.4	10.32	62.3	15.4	36.21	48.6
64.66	53.6	16.9	38.60	58.7	16.4	10.01	62.5	16.4	35.50	48.9
65.39	53.8	17.9	38.93	58.5	17.4	9.70	62.6	17.4	34.80	49.1
66.17	54.1	18.9	39.29	58.3	18.3	9.38	62.8	18.4	34.10	49.4
66.98	54.3	19.9	39.64	58.0	19.3	9.05	63.0	19.4	33.37	49.7
67.82	54.5	20.9	40.05	57.8	20.3	8.71	63.2	20.4	32.58	50.0
68.67	54.8	21.9	40.47	57.5	21.3	8.35	63.4	21.4	31.73	50.3
69.51	55.1	22.9	40.94	57.3	22.3	8.96	63.6	22.4	30.80	50.6
70.30	55.4	23.9	41.42	57.1	23.3	7.55	63.8	23.4	29.80	50.9
71.03	55.7	24.9	41.89	56.9	24.3	7.13	63.9	24.4	28.73	51.2
71.70	56.0	25.8	42.39	56.7	25.3	6.72	64.1	25.4	27.64	51.5
72.32	56.4	26.8	42.88	56.6	26.3	6.32	64.2	26.4	26.54	51.7
72.89	56.7	27.8	43.33	56.4	27.3	5.92	64.3	27.4	25.46	51.9
73.44	57.0	28.8	43.79	56.3	28.3	5.54	64.4	28.4	24.44	52.1
74.00	57.3	29.8	44.20	56.1	29.3	5.17	64.5	29.4	23.46	52.4
74.58	57.5	30.8	44.60	56.0	30.3	4.81	64.6	30.4	22.53	52.6
75.20	57.8	31.8	45.01	55.8	31.3	4.45	64.7	31.4	21.62	52.8
75.86	58.1	32.8	45.42	55.6	32.3	4.09	64.8	32.4	20.70	53.0

CIRCUMPOLAR STARS.

APPARENT PLACES FOR THE UPPER TRANSIT AT WASHINGTON.

Mean Solar Date.	α Ursæ Minoris. (*Polaris.*) Right Ascension.	Declination *North.*	Mean Solar Date.	51 Cephei (Hev.) Right Ascension.	Declination *North.*	Mean Solar Date.	δ Ursæ Minoris. Right Ascension.	Declination *North.*	Mean Solar Date.	λ Ursæ Minoris. Right Ascension.	Declination *North.*
Sept.	h m 1 18	° ′ +88 41	Sept.	h m 6 46	° ′ +87 12	Sept.	h m 18 8	° ′ +86 37	Sept.	h m 19 37	+88 [illegible]
	s	″		s	″		s	″		s	″
1.6	15.86	58.1	1.8	45.42	55.6	1.3	64.09	4.8	1.4	80.70	[illegible]
2.6	16.57	58.3	2.8	45.86	55.4	2.3	63.71	5.0	2.4	79.75	[illegible]
3.6	17.29	58.7	3.8	46.33	55.2	3.3	63.31	5.1	3.4	78.74	[illegible]
4.6	18.00	59.0	4.8	46.82	55.0	4.3	62.90	5.3	4.4	77.66	[illegible]
5.6	18.68	59.3	5.8	47.34	54.9	5.3	62.48	5.4	5.4	76.51	[illegible]
6.6	19.30	59.7	6.8	47.86	54.7	6.3	62.05	5.5	6.4	75.31	[illegible]
7.6	19.87	60.0	7.8	48.40	54.6	7.3	61.61	5.6	7.4	74.07	[illegible]
8.6	20.38	60.4	8.8	48.91	54.5	8.3	61.18	5.6	8.4	72.83	[illegible]
9.6	20.83	60.7	9.8	49.43	54.4	9.3	60.76	5.7	9.4	71.60	[illegible]
10.6	21.23	61.1	10.8	49.91	54.3	10.3	60.35	5.7	10.3	70.40	[illegible]
11.6	21.60	61.4	11.8	50.37	54.2	11.3	59.95	5.7	11.3	69.24	[illegible]
12.6	22.00	61.7	12.8	50.80	54.1	12.3	59.57	5.8	12.3	68.14	[illegible]
13.6	22.43	62.0	13.8	51.24	54.0	13.3	59.20	5.8	13.3	67.08	[illegible]
14.6	22.90	62.3	14.8	51.67	53.9	14.3	58.82	5.9	14.3	66.03	[illegible]
15.6	23.42	62.6	15.8	52.13	53.8	15.3	58.44	5.9	15.3	64.96	[illegible]
16.6	23.97	62.9	16.8	52.60	53.6	16.3	58.04	6.0	16.3	63.84	[illegible]
17.6	24.52	63.3	17.8	53.11	53.5	17.3	57.62	6.1	17.3	62.65	[illegible]
18.6	25.07	63.6	18.8	53.65	53.4	18.3	57.18	6.2	18.3	61.40	[illegible]
19.6	25.58	64.0	19.8	54.21	53.3	19.3	56.72	6.2	19.3	60.00	[illegible]
20.6	26.03	64.4	20.8	54.79	53.2	20.3	56.26	6.3	20.3	58.73	[illegible]
21.6	26.42	64.8	21.8	55.35	53.1	21.3	55.80	6.3	21.3	57.32	[illegible]
22.5	26.74	65.2	22.8	55.91	53.0	22.3	55.35	6.3	22.3	55.89	[illegible]
23.5	27.00	65.6	23.8	56.46	53.0	23.3	54.90	6.3	23.3	54.49	[illegible]
24.5	27.24	66.0	24.8	56.98	53.0	24.2	54.46	6.2	24.3	53.14	[illegible]
25.5	27.47	66.3	25.8	57.47	53.0	25.2	54.04	6.2	25.3	51.83	[illegible]
26.5	27.71	66.7	26.8	57.97	52.9	26.2	53.64	6.1	26.3	50.58	[illegible]
27.5	27.98	67.0	27.8	58.43	52.9	27.2	53.25	6.1	27.3	49.37	[illegible]
28.5	28.30	67.3	28.8	58.91	52.8	28.2	52.86	6.1	28.3	48.18	[illegible]
29.5	28.66	67.7	29.8	59.40	52.7	29.2	52.46	6.1	29.3	46.96	[illegible]
30.5	29.04	68.0	30.8	59.91	52.6	30.2	52.04	6.1	30.3	45.71	[illegible]
31.5	29.41	68.4	31.8	60.45	52.6	31.2	51.61	6.1	31.3	44.41	[illegible]

CIRCUMPOLAR STARS.

APPARENT PLACES FOR THE UPPER TRANSIT AT WASHINGTON.

α Ursæ Minoris. (*Polaris.*)		Mean Solar Date.	51 Cephei (Hev.)		Mean Solar Date.	δ Ursæ Minoris.		Mean Solar Date.	λ Ursæ Minoris.	
Right Ascension.	Declination *North.*		Right Ascension.	Declination *North.*		Right Ascension.	Declination *North.*		Right Ascension.	Declination *North.*
h m 1 18	° ′ +88 42	Oct.	h m 6 47	° ′ +87 12	Oct.	h m 18 8	° ′ +86 37	Oct.	h m 19 37	° ′ +88 57
s	″		s	″		s	″		s	″
29.41	8.4	1.8	0.45	52.6	1.2	51.61	6.1	1.3	44.41	58.5
29.75	8.8	2.7	1.01	52.5	2.2	51.17	6.1	2.3	43.05	58.6
30.05	9.2	3.7	1.57	52.5	3.2	50.72	6.1	3.3	41.63	58.8
30.29	9.6	4.7	2.17	52.5	4.2	50.27	6.1	4.3	40.17	58.9
30.47	10.0	5.7	2.73	52.5	5.2	49.81	6.0	5.3	38.68	59.0
30.58	10.4	6.7	3.29	52.5	6.2	49.37	5.9	6.3	37.21	59.1
30.64	10.8	7.7	3.82	52.5	7.2	48.94	5.8	7.3	35.78	59.1
30.66	11.2	8.7	4.32	52.6	8.2	48.54	5.7	8.3	34.40	59.2
30.68	11.5	9.7	4.80	52.6	9.2	48.15	5.6	9.3	33.07	59.2
30.73	11.9	10.7	5.27	52.6	10.2	47.77	5.5	10.3	31.80	59.2
30.81	12.2	11.7	5.73	52.6	11.2	47.39	5.4	11.3	30.56	59.3
30.94	12.5	12.7	6.22	52.6	12.2	47.01	5.4	12.3	29.33	59.3
31.10	12.9	13.7	6.69	52.6	13.2	46.62	5.3	13.3	28.06	59.4
31.28	13.2	14.7	7.22	52.6	14.2	46.22	5.3	14.3	26.74	59.5
31.45	13.6	15.7	7.77	52.6	15.2	45.80	5.2	15.3	25.37	59.6
31.59	14.0	16.7	8.34	52.7	16.2	45.37	5.1	16.2	23.94	59.7
31.68	14.4	17.7	8.92	52.7	17.2	44.93	5.0	17.2	22.46	59.7
31.71	14.9	18.7	9.49	52.7	18.2	44.49	4.9	18.2	20.93	59.8
31.67	15.3	19.7	10.07	52.8	19.2	44.05	4.8	19.2	19.38	59.8
31.57	15.7	20.7	10.63	52.9	20.2	43.63	4.6	20.2	17.86	59.8
31.42	16.1	21.7	11.16	53.0	21.2	43.22	4.4	21.2	16.37	59.8
31.26	16.5	22.7	11.67	53.1	22.2	42.83	4.3	22.2	14.96	59.8
31.10	16.8	23.7	12.14	53.2	23.2	42.45	4.1	23.2	13.60	59.7
30.97	17.2	24.7	12.60	53.3	24.2	42.09	4.0	24.2	12.31	59.7
30.87	17.5	25.7	13.07	53.4	25.2	41.74	3.8	25.2	11.03	59.7
30.81	17.8	26.7	13.53	53.4	26.2	41.39	3.7	26.2	9.76	59.7
30.78	18.2	27.7	14.02	53.5	27.2	41.02	3.6	27.2	8.47	59.7
30.75	18.6	28.7	14.53	53.5	28.2	40.64	3.4	28.2	7.14	59.7
30.71	18.9	29.7	15.06	53.6	29.2	40.26	3.3	29.2	5.75	59.8
30.63	19.3	30.7	15.61	53.7	30.1	39.87	3.2	30.2	4.31	59.8
30.49	19.7	31.7	16.14	53.8	31.1	39.46	3.0	31.2	2.84	59.7
30.28	20.1	32.7	16.69	53.9	32.1	39.06	2.8	32.2	1.35	59.7

CIRCUMPOLAR STARS.

APPARENT PLACES FOR THE UPPER TRANSIT AT WASHINGTON.

Mean Solar Date.	α Ursæ Minoris. (*Polaris.*)		Mean Solar Date.	51 Cephei (Hev.)		Mean Solar Date.	δ Ursæ Minoris.		Mean Solar Date.	λ Ursæ Minoris.	
	Right Ascension.	Declination *North.*		Right Ascension.	Declination *North.*		Right Ascension.	Declination *North.*		Right Ascension.	Declination *North.*
Nov.	h m 1 18	° ′ +88 42	Nov.	h m 6 47	° ′ +87 12	Nov.	h m 18 8	° ′ +86 36	Nov.	h m 19 36	° +88 5
	s	″		s	″		s	″		s	″
1.4	30.28	20.1	1.7	16.69	53.9	1.1	39.06	62.8	1.2	61.35	59.7
2.4	30.00	20.5	2.7	17.21	54.1	2.1	38.68	62.6	2.2	59.87	59.7
3.4	29.67	20.9	3.7	17.71	54.3	3.1	38.32	62.4	3.2	58.43	59.6
4.4	29.30	21.3	4.7	18.19	54.4	4.1	37.97	62.1	4.2	57.04	59.5
5.4	28.91	21.6	5.7	18.63	54.6	5.1	37.64	61.9	5.2	55.71	59.
6.4	28.53	21.9	6.7	19.05	54.8	6.1	37.32	61.7	6.2	54.45	59.
7.4	28.18	22.2	7.7	19.46	54.9	7.1	37.02	61.4	7.2	53.24	59.
8.4	27.87	22.5	8.6	19.87	55.0	8.1	36.72	61.2	8.2	52.06	59.
9.4	27.60	22.9	9.6	20.29	55.2	9.1	36.42	61.0	9.2	50.68	59
10.4	27.36	23.2	10.6	20.73	55.3	10.1	36.11	60.9	10.2	49.65	58
11.4	27.12	23.5	11.6	21.18	55.4	11.1	35.78	60.7	11.2	48.38	58
12.4	26.86	23.9	12.6	21.67	55.6	12.1	35.44	60.5	12.2	47.06	58
13.4	26.56	24.3	13.6	22.18	55.7	13.1	35.09	60.2	13.2	45.60	5
14.4	26.20	24.6	14.6	22.68	55.9	14.1	34.73	60.0	14.2	44.28	5
15.4	25.77	25.0	15.6	23.17	56.1	15.1	34.38	59.8	15.2	42.85	5
16.4	25.27	25.4	16.6	23.65	56.3	16.1	34.05	59.5	16.2	41.43	5
17.4	24.72	25.7	17.6	24.10	56.5	17.1	33.73	59.2	17.2	40.06	5
18.4	24.15	26.1	18.6	24.53	56.8	18.1	33.43	58.9	18.2	38.75	5
19.4	23.58	26.4	19.6	24.94	57.0	19.1	33.16	58.6	19.2	37.52	5
20.4	23.02	26.7	20.6	25.30	57.2	20.1	32.91	58.3	20.2	36.36	5
21.4	22.49	27.0	21.6	25.66	57.4	21.1	32.67	58.1	21.1	35.26	5
22.4	22.00	27.2	22.6	26.02	57.6	22.1	32.43	57.8	22.1	34.17	5
23.4	21.55	27.5	23.6	26.39	57.8	23.1	32.19	57.6	23.1	33.08	5
24.4	21.12	27.8	24.6	26.78	58.0	24.1	31.93	57.3	24.1	31.97	5
25.4	20.68	28.1	25.6	27.18	58.2	25.1	31.67	57.1	25.1	30.83	5
26.4	20.21	28.4	26.6	27.59	58.4	26.1	31.40	56.8	26.1	29.64	5
27.4	19.69	28.7	27.6	28.01	58.6	27.1	31.13	56.6	27.1	28.41	5
28.4	19.11	29.1	28.6	28.44	58.8	28.1	30.86	56.3	28.1	27.16	5
29.4	18.46	29.4	29.6	28.84	59.1	29.1	30.60	56.0	29.1	25.92	5
30.4	17.75	29.7	30.6	29.22	59.4	30.1	30.35	55.6	30.1	24.71	5
31.4	16.99	30.0	31.6	29.56	59.7	31.1	30.13	55.3	31.1	23.57	5

CIRCUMPOLAR STARS.

APPARENT PLACES FOR THE UPPER TRANSIT AT WASHINGTON.

Mean Solar Date.	α Ursæ Minoris. (*Polaris.*)		Mean Solar Date.	51 Cephei (Hev.)		Mean Solar Date.	δ Ursæ Minoris.		Mean Solar Date.	λ Ursæ Minoris.	
	Right Ascension.	Declination *North.*		Right Ascension.	Declination *North.*		Right Ascension.	Declination *North.*		Right Ascension.	Declination *North.*
	h m	° ′		h m	° ′		h m	° ′		h m	° ′
Dec.	1 17	+88 42	Dec.	6 47	+87 12	Dec.	18 8	+86 36	Dec.	19 35	+88 57
	s	″		s	″		s	″		s	″
1.4	76.99	30.0	1.6	29.56	59.7	1.1	30.13	55.3	1.1	83.57	55.9
2.4	76.21	30.2	2.6	29.87	60.0	2.1	29.94	55.0	2.1	82.50	55.7
3.4	75.43	30.5	3.6	30.15	60.2	3.1	29.77	54.6	3.1	81.51	55.4
4.3	74.68	30.7	4.6	30.44	60.5	4.1	29.61	54.3	4.1	80.58	55.2
5.3	73.98	30.9	5.6	30.69	60.8	5.0	29.45	54.0	5.1	79.69	54.9
6.3	73.31	31.2	6.6	30.97	61.0	6.0	29.30	53.7	6.1	78.81	54.7
7.3	72.68	31.4	7.6	31.24	61.2	7.0	29.14	53.4	7.1	77.93	54.5
8.3	72.07	31.6	8.6	31.54	61.6	8.0	28.98	53.1	8.1	77.02	54.3
9.3	71.45	31.8	9.6	31.85	61.7	9.0	28.80	52.8	9.1	76.06	54.1
10.3	70.80	32.1	10.6	32.18	62.0	10.0	28.60	52.6	10.1	75.05	53.9
11.3	70.10	32.4	11.6	32.52	62.2	11.0	28.41	52.2	11.1	74.02	53.7
12.3	69.33	32.6	12.6	32.84	62.5	12.0	28.22	51.9	12.1	72.97	53.5
13.3	68.50	32.9	13.6	33.16	62.8	13.0	28.05	51.6	13.1	71.93	53.2
14.3	67.62	33.1	14.5	33.45	63.2	14.0	27.89	51.2	14.1	70.94	52.9
15.3	66.70	33.3	15.5	33.71	63.5	15.0	27.75	50.8	15.1	70.01	52.7
16.3	65.78	33.5	16.5	33.93	63.8	16.0	27.64	50.4	16.1	69.15	52.4
17.3	64.88	33.7	17.5	34.13	64.2	17.0	27.55	50.1	17.1	68.38	52.0
18.3	64.00	33.9	18.5	34.29	64.5	18.0	27.47	49.7	18.1	67.68	51.8
19.3	63.16	34.1	19.5	34.46	64.8	19.0	27.40	49.4	19.1	67.02	51.5
20.3	62.37	34.2	20.5	34.63	65.0	20.0	27.33	49.1	20.1	66.38	51.2
21.3	61.62	34.4	21.5	34.82	65.3	21.0	27.27	48.8	21.1	65.73	51.0
22.3	60.87	34.5	22.5	35.01	65.6	22.0	27.19	48.5	22.1	65.05	50.7
23.3	60.11	34.7	23.5	35.22	65.8	23.0	27.10	48.2	23.1	64.34	50.5
24.3	59.31	34.9	24.5	35.44	66.1	24.0	27.01	47.9	24.1	63.60	50.2
25.3	58.45	35.1	25.5	35.65	66.4	25.0	26.92	47.5	25.1	62.83	49.9
26.3	57.53	35.3	26.5	35.86	66.8	26.0	26.83	47.2	26.1	62.08	49.7
27.3	56.56	35.4	27.5	36.03	67.1	27.0	26.76	46.8	27.1	61.37	49.3
28.3	55.54	35.6	28.5	36.19	67.5	28.0	26.73	46.4	28.1	60.71	49.0
29.3	54.50	35.7	29.5	36.29	67.8	29.0	26.71	46.0	29.1	60.12	48.7
30.3	53.46	35.8	30.5	36.33	68.2	30.0	26.71	45.6	30.1	59.61	48.3
31.3	52.44	35.9	31.5	36.42	68.6	31.0	26.72	45.3	31.1	59.19	48.0
32.3	51.46	36.0	32.5	36.45	68.9	32.0	26.76	44.9	32.1	58.83	47.6

APPARENT PLACES FOR THE UPPER TRANSIT AT WASHINGTON.

Mean Solar Date.	α Andromedæ. Right Ascension.		α Andromedæ. Declination North.		γ Pegasi. (*Algenib.*) Right Ascension.		γ Pegasi. (*Algenib.*) Declination North.		β Hydri Right Ascension.		β Hydri Declination South.		12 Ceti. Right Ascension.		12 Ceti. Declination South.	
	h m 0 2		° ′ +28 27		h m 0 7		° ′ +14 32		h m 0 19		° ′ −77 53		h m 0 24		° ′ − 4 34	
	s		″		s		″		s		″		s		″	
(Dec. 30.2)	29.72	−.15	46.8	−0.8	21.79	−.13	61.3	−0.8	41.04	−.93	69.0	+0.7	12.96	−.12	79.3	−0.3
Jan. 9.2	29.57	.15	45.8	1.1	21.66	.12	60.4	1.0	40.14	.88	68.1	1.3	12.84	.12	80.0	0.6
19.2	29.43	.14	44.6	1.4	21.54	.12	59.4	1.0	39.29	.81	66.5	1.8	12.73	.11	80.5	0.5
29.1	29.30	.12	43.1	1.5	21.43	.10	58.3	1.1	38.52	.71	64.4	2.4	12.62	.10	81.0	0.4
Feb. 8.1	29.19	.10	41.5	1.6	21.34	.08	57.2	1.1	37.86	.60	61.8	2.8	12.52	.09	81.3	0.3
18.1	29.10	−.07	39.8	−1.7	21.26	−.06	56.2	−1.0	37.32	−.47	58.8	+3.1	12.44	−.07	81.5	−0.1
28.1	29.05	−.04	38.1	1.7	21.22	−.03	55.2	0.9	36.91	.33	55.5	3.4	12.38	.04	81.4	+0.1
Mar. 10.0	29.03	.00	36.5	1.5	21.20	.00	54.3	0.8	36.65	.19	51.9	3.6	12.36	−.01	81.2	0.4
20.0	29.05	+.04	35.0	1.4	21.22	+.04	53.6	0.6	36.54	−.03	48.2	3.7	12.36	+.02	80.7	0.6
30.0	29.12	.09	33.8	1.1	21.28	.08	53.2	−0.3	36.59	+.13	44.4	3.8	12.40	.06	80.0	0.6
Apr. 9.0	29.23	+.14	32.8	−0.8	21.38	+.12	53.0	0.0	36.80	+.28	40.6	+3.7	12.48	+.10	79.1	+1.1
19.0	29.39	.18	32.2	−0.5	21.52	.16	53.1	+0.3	37.16	.44	36.9	3.6	12.60	.14	77.9	1.3
28.9	29.59	.22	31.9	0.0	21.71	.20	53.6	0.6	37.68	.59	33.4	3.4	12.77	.18	76.5	1.5
May 8.9	29.84	.26	32.0	+0.3	21.93	.24	54.3	0.9	38.34	.72	30.2	3.1	12.97	.22	74.8	1.7
18.9	30.11	.29	32.5	0.7	22.18	.27	55.4	1.2	39.12	.84	27.2	2.7	13.20	.25	73.0	1.9
28.8	30.42	+.31	33.4	+1.1	22.46	+.29	56.7	+1.5	40.02	+.94	24.7	+2.3	13.46	+.27	71.1	+2.0
June 7.8	30.74	.33	34.6	1.4	22.76	.30	58.3	1.7	41.01	1.02	22.6	1.9	13.75	.29	69.1	2.0
17.8	31.07	.33	36.2	1.7	23.07	.31	60.1	1.9	42.07	1.08	20.9	1.4	14.05	.30	67.1	2.0
27.7	31.41	.33	38.1	2.0	23.38	.31	62.0	2.0	43.17	1.10	19.8	0.8	14.35	.30	65.1	2.0
July 7.7	31.73	.31	40.2	2.2	23.69	.30	64.1	2.1	44.28	1.10	19.3	+0.2	14.66	.30	63.2	1.9
17.7	32.04	+.30	42.4	+2.3	23.98	+.28	66.2	+2.1	45.37	1.07	19.4	−0.3	14.95	+.29	61.4	+1.7
27.7	32.32	.27	44.8	2.4	24.26	.26	68.3	2.1	46.42	1.01	20.0	0.9	15.23	.27	59.8	1.5
Aug. 6.6	32.58	.24	47.3	2.5	24.50	.23	70.3	2.0	47.39	.91	21.2	1.4	15.48	.24	58.3	1.3
16.6	32.80	.20	49.7	2.4	24.71	.19	72.3	1.9	48.25	.79	22.8	1.9	15.71	.21	57.2	1.0
26.6	32.98	.16	52.1	2.3	24.89	.16	74.1	1.7	48.97	.64	25.0	2.4	15.90	.17	56.3	0.8
Sept. 5.6	33.12	+.12	54.4	+2.2	25.03	+.12	75.8	+1.5	49.53	+.47	27.6	−2.7	16.05	+.14	55.6	+0.5
15.5	33.22	.08	56.6	2.1	25.13	.08	77.2	1.3	49.92	.29	30.4	2.9	16.17	.10	55.3	+0.2
25.5	33.27	+.04	58.6	1.9	25.19	.04	78.4	1.1	50.12	+.10	33.4	3.1	16.25	.06	55.2	0.0
Oct. 5.5	33.29	.00	60.4	1.7	25.22	+.01	79.4	0.9	50.13	−.09	36.6	3.1	16.29	+.03	55.4	−0.2
15.5	33.28	−.03	62.0	1.4	25.21	−.02	80.2	0.7	49.95	.27	39.7	3.0	16.30	.00	55.7	0.4
25.4	33.23	−.06	63.3	+1.2	25.18	−.05	80.8	+0.4	49.59	−.44	42.6	−2.8	16.29	−.03	56.2	−0.6
Nov. 4.4	33.16	.09	64.4	0.9	25.12	.07	81.1	+0.2	49.07	.59	45.2	2.5	16.24	.06	56.9	0.7
14.4	33.06	.11	65.1	0.6	25.04	.09	81.2	0.0	48.40	.72	47.5	2.0	16.17	.07	57.7	0.8
24.3	32.94	.12	65.5	+0.3	24.94	.10	81.1	−0.2	47.63	.82	49.3	1.5	16.09	.09	58.5	0.8
Dec. 4.3	32.81	.14	65.7	0.0	24.83	.11	80.8	0.4	46.76	.89	50.5	0.9	15.99	.10	59.3	0.8
14.3	32.67	−.14	65.5	−0.3	24.71	−.12	80.3	−0.6	45.85	−.92	51.2	−0.3	15.88	−.11	60.2	−0.8
24.3	32.52	.15	65.0	0.6	24.59	.12	79.7	0.7	44.92	.93	51.2	+0.3	15.77	.12	60.9	0.7
34.2	32.37	−.15	64.2	−0.9	24.46	−.13	78.9	−0.9	43.99	−.93	50.6	+0.9	15.65	−.12	61.7	−0.7

APPARENT PLACES FOR THE UPPER TRANSIT AT WASHINGTON.

[illegible]	α Cass. Right Ascension.	
	h m 0 34	
	s	
(Dec. 30.3)	3.31	−[illegible]
Jan. 9.2	3.02	[illegible]
19.2	2.72	[illegible]
29.2	2.44	.27
Feb. 8.1	2.18	[illegible]
18.1	1.96	−[illegible]
28.1	1.79	.14
Mar. 10.1	1.67	[illegible]
20.0	1.63	−.01
30.0	1.65	+[illegible]
Apr. 9.0	1.75	+.14
19.0	1.93	.01
28.9	2.17	[illegible]
May 8.9	2.49	.34
18.0	2.86	[illegible]
[illegible]	3.26	+.43
June 7.8	3.70	.45
17.8	4.16	.47
27.8	4.64	.47
July 7.7	5.10	[illegible]
17.7	5.55	+.44
27.7	5.98	.40
Aug. 6.7	6.36	[illegible]
16.6	6.70	[illegible]
26.6	6.99	[illegible]
Sept. 5.6	7.23	+.21
[illegible]	7.41	.15
25.5	7.53	[illegible]
Oct. 5.5	7.60	+.04
15.5	7.60	−[illegible]
25.4	7.56	−.07
Nov. 4.4	7.46	.10
14.4	7.32	.16
24.3	7.14	[illegible]
Dec. 4.3	6.92	[illegible]
14.3	6.66	−.27
24.3	6.39	[illegible]
34.2	6.10	−[illegible]

APPARENT PLACES FOR THE UPPER TRANSIT AT WASHINGTON.

Mean Solar Date.	β Andromedæ.		θ¹ Ceti.		38 Cassiopeæ.		η Piscium.	
	Right Ascension.	Declination *North.*	Right Ascension.	Declination *South.*	Right Ascension.	Declination *North.*	Right Ascension.	Declination *North.*
	h m 1 3	+35° 0′	h m 1 18	− 8° 46′	h m 1 22	+69° 40′	h m 1 25	+14° 45′
	s	″	s	″	s	″	s	″
(Dec.30.3)	21.51 −.16	63.9 −0.3	19.50 −.12	27.5 −0.8	47.63 −.50	52.3 +0.8	23.31 −.12	27.4 −0.5
Jan. 9.3	21.34 .17	63.4 0.6	19.38 .13	28.2 0.7	47.12 .53	52.8 +0.2	23.18 .13	26.7 0.7
19.2	21.16 .18	62.6 0.9	19.24 .13	28.8 0.5	46.58 .54	52.6 −0.5	23.04 .14	26.0 0.8
29.2	20.99 .17	61.5 1.2	19.11 .13	29.3 0.3	46.04 .53	51.9 1.0	22.90 .14	25.2 0.8
Feb. 8.2	20.82 .16	60.1 1.4	18.98 .13	29.5 −0.1	45.52 .50	50.6 1.5	22.76 .13	24.4 0.8
18.1	20.67 −.14	58.6 −1.6	18.86 −.11	29.5 +0.1	45.04 −.45	48.8 −2.0	22.63 −.12	23.6 −0.8
28.1	20.55 .11	56.9 1.7	18.76 .09	29.3 0.3	44.62 .37	46.7 2.3	22.52 .10	22.8 0.8
Mar. 10.1	20.46 .07	55.2 1.7	18.68 .06	28.8 0.6	44.30 .28	44.2 2.6	22.43 .07	22.0 0.7
20.1	20.41 −.02	53.5 1.6	18.63 −.03	28.2 0.8	44.07 .17	41.4 2.8	22.38 −.04	21.4 0.5
30.0	20.40 +.02	52.0 1.5	18.61 +.01	27.3 1.1	43.95 −.06	38.6 2.8	22.36 .00	21.0 0.4
Apr. 9.0	20.45 +.07	50.6 −1.3	18.64 +.05	26.1 +1.3	43.95 +.06	35.8 −2.8	22.38 +.05	20.7 −0.1
19.0	20.56 .13	49.4 1.0	18.70 .09	24.7 1.5	44.08 .18	33.0 2.6	22.45 .09	20.7 +0.1
29.0	20.71 .18	48.6 0.7	18.81 .13	23.1 1.7	44.32 .30	30.6 2.3	22.56 .14	21.0 0.4
May 8.9	20.91 .23	48.0 −0.3	18.97 .17	21.3 1.9	44.68 .41	28.4 2.0	22.72 .18	21.5 0.7
18.9	21.16 .27	47.9 0.0	19.16 .21	19.3 2.0	45.14 .50	26.6 1.6	22.92 .22	22.2 0.9
28.9	21.45 +.30	48.1 +0.4	19.39 +.24	17.3 +2.1	45.68 +.58	25.2 −1.1	23.15 +.25	23.3 +1.2
June 7.8	21.76 .33	48.7 0.8	19.65 .27	15.2 2.1	46.30 .64	24.4 0.6	23.42 .28	24.6 1.4
17.8	22.10 .35	49.7 1.1	19.93 .29	13.0 2.1	46.96 .68	24.0 −0.1	23.71 .30	26.1 1.6
27.8	22.46 .35	51.0 1.5	20.22 .30	10.9 2.0	47.66 .71	24.1 +0.4	24.01 .31	27.7 1.7
July 7.8	22.81 .35	52.6 1.7	20.53 .30	8.9 1.9	48.37 .71	24.8 0.9	24.32 .31	29.5 1.8
17.7	23.16 +.34	54.5 +2.0	20.83 +.30	7.1 +1.7	49.08 +.70	26.0 +1.4	24.63 +.31	31.4 +1.9
27.7	23.49 .32	56.5 2.1	21.13 .29	5.5 1.5	49.77 .67	27.6 1.8	24.93 .29	33.2 1.9
Aug. 6.7	23.80 .30	58.8 2.3	21.41 .27	4.1 1.2	50.42 .63	29.6 2.2	25.22 .28	35.1 1.8
16.6	24.08 .27	61.1 2.4	21.66 .24	3.0 0.9	51.03 .58	32.0 2.6	25.48 .25	36.9 1.7
26.6	24.33 .23	63.5 2.4	21.90 .22	2.2 0.6	51.58 .51	34.7 2.9	25.72 .22	38.5 1.6
Sept. 5.6	24.55 +.20	65.8 +2.4	22.10 +.18	1.7 +0.3	52.05 +.44	37.7 +3.1	25.93 +.19	40.1 +1.4
15.6	24.72 .16	68.2 2.3	22.26 .15	1.6 0.0	52.45 .36	40.9 3.3	26.11 .16	41.4 1.3
25.5	24.86 .12	70.4 2.2	22.40 .12	1.7 −0.3	52.76 .27	44.3 3.4	26.25 .13	42.6 1.1
Oct. 5.5	24.96 .08	72.6 2.0	22.49 .08	2.1 0.5	52.99 .18	47.7 3.4	26.36 .09	43.6 0.9
15.5	25.02 +.04	74.5 1.9	22.56 .05	2.8 0.8	53.13 +.09	51.1 3.4	26.44 .06	44.3 0.7
25.5	25.04 .00	76.3 +1.7	22.59 +.02	3.6 −0.9	53.18 .00	54.5 +3.3	26.48 +.03	44.9 +0.5
Nov. 4.4	25.03 −.03	77.8 1.4	22.59 −.01	4.6 1.0	53.14 −.09	57.6 3.1	26.50 .00	45.3 0.3
14.4	24.98 .06	79.2 1.2	22.57 .04	5.7 1.1	53.00 .18	60.6 2.8	26.49 −.02	45.5 +0.1
24.4	24.91 .09	80.2 0.9	22.52 .06	6.8 1.1	52.78 .26	63.3 2.5	26.46 .05	45.5 0.0
Dec. 4.3	24.81 .11	80.9 0.6	22.45 .08	8.0 1.1	52.48 .34	65.6 2.1	26.39 .07	45.4 −0.2
14.3	24.68 −.14	81.3 +0.2	22.36 −.10	9.0 −1.0	52.09 −.41	67.4 +1.6	26.31 −.09	45.1 −0.3
24.3	24.54 .15	81.3 −0.1	22.25 .11	10.0 0.9	51.65 .47	68.8 1.1	26.21 .11	44.7 0.5
34.3	24.38 −.17	81.1 −0.4	22.13 −.12	10.8 −0.8	51.16 −.51	69.6 +0.5	26.09 −.12	44.2 −0.6

APPARENT PLACES FOR THE UPPER TRANSIT AT WASHINGTON.

Mean Solar Date.	α Persei. Right Ascension.	α Persei. Declination North.	ε Eridani. Right Ascension.	ε Eridani. Declination South.	δ Persei. Right Ascension.	δ Persei. Declination North.	η Tauri. Right Ascension.	η Tauri. Dec N
	h m 3 16	+49° 27′	h m 3 27	− 9° 50′	h m 3 34	+47° 25′	h m 3 40	+
	s	″	s	″	s	″	s	
(Dec. 30.4)	12.85 −.13	18.8 +1.1	34.28 −.08	52.8 −1.3	50.26 −.10	20.2 +1.2	43.53 −.05	
Jan. 9.3	12.70 .18	19.8 0.8	34.19 .10	54.0 1.1	50.13 .15	21.2 0.9	43.46 .09	
19.3	12.50 .22	20.5 0.5	34.07 .13	55.0 0.9	49.96 .19	22.0 0.6	43.34 .13	
29.3	12.26 .25	20.8 +0.1	33.93 .15	55.8 0.7	49.74 .23	22.4 +0.2	43.20 .16	
Feb. 8.2	12.00 .27	20.7 −0.3	33.77 .17	56.4 0.4	49.50 .25	22.4 −0.1	43.03 .17	
18.2	11.73 −.27	20.2 −0.7	33.59 −.17	56.7 −0.2	49.24 −.26	22.1 −0.5	42.85 −.18	
28.2	11.45 .27	19.3 1.0	33.42 .17	56.8 +0.1	48.97 .26	21.4 0.8	42.67 .19	
Mar. 10.2	11.20 .24	18.2 1.3	33.25 .16	56.6 0.3	48.72 .24	20.5 1.1	42.48 .17	
20.1	10.97 .21	16.7 1.5	33.09 .14	56.1 0.6	48.49 .21	19.3 1.3	42.32 .15	
30.1	10.79 .16	15.1 1.7	32.96 .12	55.4 0.8	48.29 .17	17.8 1.5	42.18 .12	
Apr. 9.1	10.65 −.10	13.3 −1.8	32.86 −.08	54.4 +1.1	48.15 −.12	16.2 −1.6	42.07 −.09	
19.1	10.58 −.04	11.5 1.8	32.80 −.04	53.2 1.3	48.06 −.06	14.6 1.6	42.01 −.05	
29.0	10.58 +.03	9.7 1.7	32.78 .00	51.7 1.6	48.03 +.01	13.0 1.6	41.98 .00	
May 9.0	10.64 .10	8.1 1.6	32.80 +.05	50.1 1.8	48.07 .07	11.4 1.5	42.02 +.06	
19.0	10.78 .17	6.6 1.4	32.88 .09	48.2 1.9	48.18 .14	9.9 1.4	42.10 .11	
28.9	10.98 +.23	5.3 −1.2	32.99 +.14	46.2 +2.0	48.34 +.20	8.7 −1.2	42.22 +.15	
June 7.9	11.23 .28	4.2 0.9	33.15 .18	44.1 2.1	48.57 .26	7.6 0.9	42.40 .20	
17.9	11.54 .33	3.5 0.6	33.35 .21	42.0 2.2	48.85 .30	6.9 0.6	42.62 .23	
27.9	11.90 .37	3.1 −0.2	33.57 .24	39.8 2.1	49.18 .34	6.4 −0.3	42.86 .26	
July 7.8	12.28 .40	3.0 +0.2	33.83 .26	37.7 2.1	49.54 .37	6.2 0.0	43.14 .29	
17.8	12.69 +.42	3.3 +0.4	34.10 +.28	35.7 +1.9	49.93 +.40	6.4 +0.3	43.44 +.30	
27.8	13.11 .43	3.9 0.7	34.38 .29	33.9 1.7	50.33 .41	6.8 0.6	43.75 .31	
Aug. 6.8	13.54 .43	4.8 1.0	34.67 .29	32.3 1.5	50.74 .41	7.5 0.8	44.07 .32	
16.7	13.96 .42	6.0 1.3	34.96 .28	31.0 1.2	51.16 .41	8.5 1.1	44.38 .31	
26.7	14.38 .40	7.4 1.5	35.24 .28	30.0 0.8	51.56 .40	9.7 1.3	44.70 .31	
Sept. 5.7	14.77 +.38	9.0 +1.7	35.51 +.26	29.3 +0.5	51.95 +.38	11.0 +1.5	45.00 +.29	
15.6	15.14 .36	10.8 1.9	35.76 .24	29.0 +0.1	52.32 .36	12.6 1.6	45.28 .28	
25.6	15.48 .33	12.7 2.0	36.00 .22	29.1 −0.3	52.67 .33	14.3 1.8	45.55 .26	
Oct. 5.6	15.80 .29	14.8 2.1	36.21 .20	29.6 0.6	52.99 .30	16.2 1.9	45.79 .23	
15.6	16.06 .24	16.9 2.1	36.39 .17	30.3 0.9	53.27 .27	18.0 1.9	46.02 .21	
25.5	16.29 +.21	19.0 +2.2	36.55 +.14	31.4 −1.1	53.52 +.23	20.0 +2.0	46.21 +.18	
Nov. 4.5	16.48 .16	21.2 2.2	36.68 .11	32.6 1.3	53.73 .19	22.0 2.0	46.38 .15	
14.5	16.62 .12	23.4 2.1	36.78 .08	34.0 1.5	53.89 .14	23.9 1.9	46.52 .12	
24.5	16.70 .06	25.4 2.0	36.84 .05	35.5 1.5	54.01 .09	25.8 1.9	46.62 .08	
Dec. 4.4	16.74 +.01	27.3 1.8	36.87 +.01	37.1 1.5	54.08 +.04	27.6 1.7	46.68 .05	
14.4	16.72 −.05	29.0 +1.6	36.87 −.02	38.6 −1.5	54.09 −.02	29.3 +1.6	46.71 +.01	
24.4	16.65 .10	30.5 1.3	36.84 .05	40.0 1.4	54.04 .07	30.8 1.4	46.70 −.03	
34.4	16.53 −.15	31.7 +1.0	36.77 −.09	41.3 −1.2	53.95 −.12	32.0 +1.1	46.66 −.07	

APPARENT PLACES FOR THE UPPER TRANSIT AT WASHINGTON.

Mean Solar Date.	ζ Persei.		γ Eridani.		γ Tauri.		ε Tauri.	
	Right Ascension.	Declination *North*.	Right Ascension.	Declination *South*.	Right Ascension.	Declination *North*.	Right Ascension.	Declination *North*.
	h m 3 46	° ′ +31 32	h m 3 52	° ′ −13 49	h m 4 13	° ′ +15 20	h m 4 21	° ′ +18 55
	s	″	s	″	s	″	s	″
ec. 30.4	59.22 −.06	35.8 +0.5	43.50 −.06	74.1 −1.6	19.42 −.03	57.9 −0.3	58.70 −.02	28.8 −0.1
an. 9.3	59.14 .10	36.2 0.3	43.42 .09	75.5 1.3	19.37 .07	57.6 0.3	58.66 .06	28.7 0.1
19.3	59.02 .14	36.4 +0.2	43.32 .12	76.7 1.1	19.28 .10	57.3 0.3	58.58 .10	28.6 0.2
29.3	58.86 .17	36.5 0.0	43.17 .15	77.7 0.8	19.16 .13	57.0 0.3	58.46 .13	28.4 0.2
b. 8.3	58.68 .19	36.4 −0.2	43.01 .17	78.4 0.5	19.02 .16	56.7 0.3	58.32 .16	28.2 0.2
18.2	58.49 −.20	36.0 −0.4	42.83 −.18	78.7 −0.3	18.85 −.18	56.3 −0.3	58.14 −.18	27.9 −0.3
28.2	58.28 .20	35.5 0.6	42.65 .18	78.9 0.0	18.67 .18	56.0 0.3	57.96 .19	27.6 0.3
ar. 10.2	58.08 .19	34.9 0.7	42.46 .18	78.7 +0.3	18.48 .18	55.7 0.3	57.77 .18	27.3 0.3
20.2	57.90 .17	34.1 0.8	42.29 .16	78.2 0.6	18.31 .16	55.4 0.3	57.59 .17	27.0 0.3
30.1	57.74 .14	33.2 0.9	42.14 .14	77.5 0.9	18.16 .14	55.2 0.2	57.43 .15	26.7 0.3
pr. 9.1	57.62 −.10	32.4 −0.9	42.02 −.10	76.4 +1.2	18.03 −.11	55.0 −0.1	57.30 −.12	26.4 −0.3
19.1	57.54 −.05	31.5 0.9	41.94 .06	75.1 1.5	17.94 .07	55.0 0.0	57.20 .08	26.2 0.2
29.1	57.52 .00	30.6 0.8	41.89 −.02	73.5 1.7	17.90 −.02	55.0 +0.1	57.15 −.03	26.0 −0.1
ay 9.0	57.54 +.05	29.9 0.7	41.89 +.02	71.7 1.9	17.90 +.02	55.2 0.3	57.14 +.02	26.0 0.0
19.0	57.62 .11	29.3 0.5	41.94 .07	69.7 2.1	17.94 .07	55.5 0.4	57.18 .06	26.1 +0.1
29.0	57.75 +.16	28.9 −0.3	42.03 +.11	67.6 +2.2	18.03 +.11	56.0 +0.6	57.26 +.11	26.4 +0.3
ne 7.9	57.93 .20	28.7 −0.1	42.17 .15	65.3 2.3	18.17 .16	56.6 0.7	57.39 .15	26.8 0.5
17.9	58.15 .24	28.7 +0.1	42.34 .19	63.0 2.3	18.35 .20	57.4 0.8	57.57 .19	27.3 0.6
27.9	58.42 .26	28.9 0.3	42.55 .22	60.7 2.3	18.56 .23	58.3 1.0	57.78 .22	28.0 0.7
ly 7.9	58.71 .30	29.3 0.5	42.79 .25	58.5 2.2	18.80 .25	59.3 1.0	58.02 .25	28.8 0.8
17.8	59.02 +.32	29.9 +0.7	43.05 +.27	56.4 +2.0	19.07 +.27	60.4 +1.1	58.28 +.28	29.6 +0.9
27.8	59.35 .33	30.7 0.9	43.33 .28	54.5 1.8	19.35 .29	61.5 1.1	58.57 .28	30.6 1.0
g. 6.8	59.68 .34	31.6 1.0	43.62 .29	52.8 1.5	19.64 .30	62.6 1.1	58.87 .30	31.6 1.0
16.8	60.02 .34	32.6 1.1	43.91 .29	51.5 1.2	19.94 .30	63.7 1.0	59.17 .30	32.5 1.0
26.7	60.36 .33	33.8 1.1	44.19 .28	50.5 0.8	20.24 .30	64.7 0.9	59.47 .30	33.5 0.9
pt. 5.7	60.68 +.32	34.9 +1.2	44.47 +.27	49.8 +0.4	20.54 +.29	65.6 +0.8	59.77 +.30	34.3 +0.8
15.7	60.98 .30	36.1 1.2	44.74 .26	49.6 0.0	20.82 .28	66.3 0.7	60.07 .29	35.1 0.7
25.6	61.28 .28	37.3 1.2	44.99 .24	49.8 −0.4	21.09 .26	67.0 0.5	60.35 .27	35.7 0.6
ct. 5.6	61.54 .26	38.5 1.2	45.22 .22	50.4 0.8	21.35 .25	67.4 0.4	60.61 .26	36.2 0.5
15.6	61.79 .23	39.7 1.1	45.43 .19	51.3 1.1	21.58 .22	67.7 0.2	60.86 .24	36.6 0.4
25.6	62.00 +.20	40.8 +1.1	45.61 +.17	52.5 −1.4	21.80 +.20	67.9 +0.1	61.09 +.21	37.0 +0.3
ov. 4.5	62.19 .17	41.8 1.0	45.76 .14	54.0 1.6	21.98 .18	67.9 0.0	61.29 .19	37.2 0.2
14.5	62.34 .13	42.9 1.0	45.89 .11	55.7 1.7	22.15 .15	67.8 −0.1	61.46 .16	37.3 +0.1
24.5	62.46 .10	43.8 0.9	45.98 .07	57.5 1.8	22.28 .11	67.7 0.2	61.60 .12	37.3 0.0
ec. 4.5	62.54 .06	44.7 0.8	46.03 +.04	59.3 1.8	22.37 .08	67.5 0.2	61.71 .09	37.3 0.0
14.4	62.57 +.01	45.4 +0.7	46.05 .00	61.1 −1.8	22.43 +.04	67.3 −0.2	61.78 +.05	37.3 0.0
24.4	62.56 −.03	46.1 0.6	46.03 −.04	62.8 1.6	22.45 .00	67.0 0.3	61.81 +.01	37.2 −0.1
34.4	62.51 −.07	46.6 +0.4	45.98 −.07	64.4 −1.4	22.43 −.04	66.8 −0.3	61.80 −.03	37.2 −0.1

APPARENT PLACES FOR THE UPPER TRANSIT AT WASHINGTON.

APPARENT PLACES FOR THE UPPER TRANSIT AT WASHINGTON.

APPARENT PLACES FOR THE UPPER TRANSIT AT WASHINGTON.

Mean Solar Date.	α Canis Minoris. (*Procyon*.) Right Ascension.	Declination *North*.	β Geminorum. (*Pollux*.) Right Ascension.	Declination *North*.	φ Geminorum. Right Ascension.	Declination *North*.	3 Ursæ Majoris (H Right Ascension.	Declina *North*
	h m 7 33	+ 5° 30′	h m 7 38	+28° 17′	h m 7 46	+27° 3′	h m 8 1	+68°
	s	″	s	″	s	″	s	″
(Dec. 30.5)	21.18 +.15	49.4 −1.3	21.52 +.18	49.9 +0.1	32.32 +.19	23.6 0.0	29.97 +.41	73.
Jan. 9.5	21.31 .11	48.2 1.2	21.68 .13	50.1 0.3	32.48 .14	23.7 +0.2	30.33 .30	76.
19.5	21.39 .06	47.1 1.0	21.78 .08	50.4 0.4	32.59 .08	24.0 0.3	30.56 .17	78.
29.5	21.43 +.01	46.2 0.8	21.83 +.02	50.9 0.5	32.65 +.03	24.4 0.5	30.67 +.04	81.
Feb. 8.4	21.41 −.04	45.4 0.6	21.82 −.04	51.5 0.6	32.65 −.03	24.9 0.6	30.64 −.09	84.
18.4	21.34 −.09	44.9 −0.5	21.76 −.09	52.2 +0.7	32.60 −.08	25.6 +0.6	30.50 −.21	86.
28.4	21.24 .12	44.5 0.3	21.65 .13	52.9 0.7	32.50 .12	26.2 0.7	30.23 .31	88.
Mar. 10.3	21.10 .15	44.3 −0.1	21.50 .16	53.6 0.7	32.36 .15	26.9 0.7	29.87 .40	91.
20.3	20.94 .17	44.2 0.0	21.32 .18	54.2 0.6	32.19 .18	27.5 0.6	29.43 .46	92.
30.3	20.76 .18	44.3 +0.1	21.13 .20	54.7 0.5	32.00 .19	28.1 0.5	28.94 .51	94.
Apr. 9.3	20.59 −.18	44.5 +0.2	20.93 −.20	55.2 +0.4	31.81 −.19	28.5 +0.4	28.42 −.52	94.
19.2	20.42 .16	44.8 0.4	20.74 .19	55.5 0.2	31.62 .18	28.9 0.3	27.90 .51	95.
29.2	20.26 .15	45.2 0.5	20.56 .17	55.6 +0.1	31.44 .17	29.1 +0.2	27.39 .49	95.
May 9.2	20.12 .12	45.7 0.5	20.40 .14	55.7 0.0	31.29 .14	29.2 0.0	26.92 .44	94.
19.2	20.02 .09	46.3 0.6	20.28 .11	55.6 −0.1	31.16 .11	29.2 −0.1	26.52 .37	93.
29.1	19.94 −.06	46.9 +0.7	20.19 −.07	55.4 −0.2	31.07 −.07	29.1 −0.2	26.18 −.30	91.
June 8.1	19.90 −.03	47.6 0.7	20.14 −.03	55.1 0.3	31.02 −.03	28.9 0.2	25.92 .21	89.
18.1	19.89 +.01	48.4 0.8	20.13 +.01	54.8 0.4	31.00 .00	28.6 0.3	25.76 .12	87.
28.0	19.91 .04	49.2 0.8	20.16 .05	54.4 0.4	31.03 +.04	28.3 0.4	25.68 −.02	85.
July 8.0	19.98 .08	50.1 0.8	20.23 .09	53.9 0.5	31.09 .08	27.9 0.4	25.71 +.07	82.
18.0	20.07 +.11	50.9 +0.8	20.34 +.12	53.4 −0.5	31.18 +.11	27.4 −0.5	25.83 +.16	80.
28.0	20.19 .14	51.7 0.7	20.48 .16	52.9 0.6	31.32 .15	26.9 0.5	26.04 .26	77.
Aug. 6.9	20.34 .16	52.4 0.6	20.65 .19	52.3 0.6	31.48 .18	26.4 0.6	26.34 .34	74.
16.9	20.52 .19	53.0 0.5	20.85 .22	51.7 0.6	31.67 .21	25.8 0.6	26.72 .42	72.
26.9	20.72 .21	53.4 0.3	21.08 .24	51.0 0.7	31.89 .23	25.2 0.7	27.18 .49	69.
Sept. 5.9	20.95 +.23	53.6 +0.1	21.33 +.26	50.3 −0.7	32.14 +.26	24.5 −0.7	27.70 +.56	67.
15.8	21.19 .25	53.6 −0.1	21.61 .28	49.6 0.8	32.40 .28	23.7 0.8	28.30 .62	65.
25.8	21.45 .27	53.4 0.3	21.90 .30	48.8 0.8	32.69 .30	22.9 0.8	28.94 .67	63.
Oct. 5.8	21.73 .28	53.0 0.6	22.22 .32	48.0 0.8	33.00 .31	22.0 0.9	29.63 .71	62.
15.7	22.02 .29	52.2 0.8	22.54 .33	47.2 0.8	33.32 .33	21.1 0.9	30.36 .74	61.
25.7	22.31 +.30	51.3 −1.0	22.87 +.34	46.4 −0.8	33.65 +.33	20.2 −0.9	31.10 +.75	60.
Nov. 4.7	22.61 .29	50.2 1.2	23.21 .34	45.6 0.7	33.99 .34	19.4 0.8	31.86 .75	59.
14.7	22.90 .29	48.9 1.4	23.54 .33	44.9 0.7	34.32 .33	18.6 0.8	32.61 .74	59.
24.6	23.18 .27	47.5 1.4	23.87 .31	44.3 0.5	34.65 .32	17.9 0.7	33.34 .70	60.
Dec. 4.6	23.44 .25	46.0 1.5	24.17 .29	43.8 0.4	34.95 .29	17.3 0.5	34.02 .65	61.
14.6	23.68 +.22	44.5 −1.4	24.44 +.26	43.5 −0.2	35.23 +.26	16.9 −0.3	34.63 +.57	62.
24.6	23.88 .18	43.1 1.4	24.68 .21	43.4 0.0	35.48 .22	16.6 −0.1	35.16 .48	64.
34.5	24.04 +.14	41.8 −1.3	24.87 +.17	43.5 +0.2	35.68 +.18	16.6 +0.1	35.60 +.39	66.

APPARENT PLACES FOR THE UPPER TRANSIT AT WASHINGTON.

Mean Solar Date.	15 Argus (ι) Right Ascension.		15 Argus (ι) Declination South.		Majoris. Declination North.	
	h m 8 2		−23° 56′		+48° 26′	
ec. 30.6	s 42.75	+.17	″ 40.6	−2.8	″ 62.5	+0.8
an. 9.5	42.89	.12	43.4	2.8	63.5	1.1
19.5	42.98	.06	46.1	2.6	64.8	1.4
29.5	43.02	+.01	48.7	2.4	66.3	1.6
eb. 8.5	43.00	−.04	51.0	2.2	68.0	1.8
18.4	42.94	−.09	53.0	−1.9	69.8	+1.9
28.4	42.83	.13	54.6	1.6	71.7	1.9
ar. 10.4	42.68	.16	56.2	1.2	73.5	1.8
20.4	42.51	.18	57.2	0.8	75.2	1.6
30.3	42.32	.20	57.9	0.5	76.7	1.3
pr. 9.3	42.12	−.20	58.2	−0.1	77.9	+1.1
19.3	41.92	.19	58.1	+0.2	78.8	0.7
29.3	41.73	.19	57.7	0.6	79.4	+0.4
ay 9.2	41.56	.16	57.0	0.9	79.6	0.0
19.2	41.41	.14	55.9	1.2	79.5	−0.3
29.2	41.28	−.11	54.5	+1.5	79.1	−0.6
une 8.1	41.19	.08	52.9	1.8	78.3	0.9
18.1	41.13	.04	51.0	2.0	77.2	1.2
28.1	41.10	−.01	48.9	2.1	76.0	1.4
uly 8.1	41.11	+.03	46.7	2.2	74.5	1.6
18.0	41.16	+.06	44.5	+2.2	72.8	−1.8
28.0	41.23	.09	42.3	2.2	70.9	1.9
ug. 7.0	41.34	.13	40.1	2.1	69.0	2.0
17.0	41.49	.16	38.1	1.9	67.0	2.0
26.9	41.66	.19	36.3	1.6	64.9	2.1
ept. 5.9	41.86	+.22	34.9	+1.2	62.9	−2.1
15.9	42.09	.24	33.8	0.8	60.8	2.0
25.8	42.35	.27	33.1	+0.4	58.8	1.9
ct. 5.8	42.62	.28	32.9	0.0	57.0	1.8
15.8	42.92	.30	33.2	−0.5	55.2	1.7
25.8	43.22	+.31	34.0	−1.0	53.6	−1.4
ov. 4.7	43.53	.31	35.3	1.5	52.3	1.2
14.7	43.84	.30	37.0	1.9	51.3	0.9
24.7	44.14	.29	39.1	2.3	50.6	0.6
ec. 4.7	44.42	.27	41.5	2.5	50.2	−0.2
14.6	44.67	+.23	44.2	−2.7	50.2	+0.2
24.6	44.89	.19	46.9	2.8	50.5	0.6
34.6	45.06	+.15	49.7	−2.8	51.3	+0.9

APPARENT PLACES FOR THE UPPER TRANSIT AT WASHINGTON.

Mean Solar Date.	σ^2 Ursæ Majoris. Right Ascension.	σ^2 Ursæ Majoris. Declination North.	κ Cancri. Right Ascension.	κ Cancri. Declination North.	ι Argus. Right Ascension.	ι Argus. Declination South.	1 Draconis (H.) Right Ascension.	1 Draconis (H.) Declina[tion] North
	h m 9 0	+67° 35′	h m 9 1	+11° 7′	h m 9 14	−58° 47′	h m 9 20	+81°
	s	″	s	″	s	″	s	″
(Dec.30.6	22.58 +.51	29.1 +1.5	35.22 +.24	25.3 −1.3	4.91 +.31	43.9 −3.4	49.00 1.38	24.8
Jan. 9.6	23.05 .42	30.9 2.0	35.44 .20	24.1 1.1	5.18 .23	47.4 3.6	50.21 1.08	26.9
19.6	23.41 .31	33.1 2.3	35.61 .15	23.1 0.9	5.38 .15	51.1 3.7	51.16 +.81	29.5
29.5	23.66 .19	35.5 2.5	35.73 .10	22.4 0.6	5.49 +.07	54.9 3.7	51.83 .52	32.3
Feb. 8.5	23.79 +.07	38.1 2.7	35.80 +.05	21.8 0.4	5.51 −.01	58.6 3.6	52.19 +.21	35.4
18.5	23.79 −.06	40.8 +2.7	35.82 .00	21.6 −0.2	5.46 −.09	62.2 −3.4	52.24 −.10	38.5
28.4	23.68 .17	43.4 2.6	35.80 −.05	21.4 0.0	5.33 .16	65.5 3.2	51.98 .40	41.5
Mar. 10.4	23.46 .27	45.9 2.4	35.73 .09	21.5 +0.2	5.13 .23	68.5 2.9	51.44 .68	44.4
20.4	23.14 .35	48.2 2.1	35.62 .12	21.8 0.3	4.88 .26	71.2 2.5	50.63 .91	47.0
30.4	22.76 .41	50.1 1.7	35.49 .14	22.1 0.4	4.57 .32	73.4 2.0	49.61 1.11	49.3
Apr. 9.3	22.32 −.45	51.6 +1.3	35.34 −.15	22.5 +0.4	4.24 −.35	75.2 −1.6	48.42 1.25	51.1
19.3	21.85 .46	52.7 0.8	35.19 .16	23.0 0.5	3.88 .36	76.5 1.1	47.11 1.34	52.3
29.3	21.37 .47	53.2 +0.3	35.03 .15	23.5 0.5	3.51 .37	77.3 −0.5	45.75 1.37	53.0
May 9.3	20.90 .45	53.3 −0.2	34.88 .14	24.0 0.5	3.14 .37	77.6 0.0	44.37 1.35	53.2
19.2	20.46 .42	52.9 0.6	34.75 .13	24.6 0.5	2.77 .35	77.4 +0.5	43.04 1.29	52.8
29.2	20.07 −.36	52.1 −1.1	34.64 −.10	25.1 +0.5	2.43 −.33	76.6 +1.0	41.79 1.16	51.8
June 8.2	19.73 .30	50.8 1.5	34.54 .08	25.6 0.5	2.11 .30	75.4 1.5	40.67 1.04	50.3
18.1	19.46 .23	49.1 1.9	34.48 .05	26.1 0.5	1.83 .26	73.7 1.9	39.71 .87	48.4
28.1	19.27 .15	47.0 2.2	34.44 −.03	26.5 0.4	1.59 .22	71.6 2.3	38.93 .67	46.0
July 8.1	19.16 −.07	44.7 2.4	34.43 .00	27.0 0.4	1.40 .17	69.2 2.6	38.36 .46	43.3
18.1	19.13 +.01	42.2 −2.6	34.44 +.03	27.3 +0.3	1.26 −.11	66.5 +2.8	38.01 −.24	40.4
28.0	19.18 .10	39.5 2.8	34.49 .06	27.6 0.2	1.18 −.05	63.5 3.0	37.89 −.02	37.2
Aug. 7.0	19.32 .18	36.7 2.8	34.56 .09	27.8 +0.1	1.16 +.01	60.5 3.1	37.99 +.22	33.9
17.0	19.54 .26	33.8 2.9	34.67 .12	27.8 0.0	1.21 .08	57.4 3.0	38.33 .45	30.6
27.0	19.83 .33	31.0 2.8	34.80 .14	27.7 −0.2	1.32 .15	54.4 2.9	38.89 .67	27.2
Sept. 5.9	20.20 +.41	28.2 −2.7	34.95 +.17	27.5 −0.4	1.50 +.21	51.6 +2.6	39.66 +.88	24.0
15.9	20.64 .47	25.5 2.6	35.14 .20	27.0 0.6	1.75 .28	49.1 2.3	40.64 1.08	20.8
25.9	21.15 .54	23.0 2.4	35.35 .23	26.4 0.8	2.06 .34	47.0 1.8	41.81 1.26	17.9
Oct. 5.8	21.72 .60	20.7 2.1	35.60 .25	25.5 1.0	2.43 .39	45.5 1.3	43.16 1.42	15.3
15.8	22.35 .64	18.7 1.8	35.86 .27	24.4 1.1	2.84 .44	44.4 0.7	44.65 1.56	13.0
25.8	23.01 +.68	17.0 −1.5	36.14 +.29	23.2 −1.3	3.30 +.47	44.0 +0.1	46.28 1.67	11.1
Nov. 4.8	23.71 .71	15.7 1.1	36.45 .31	21.8 1.5	3.78 .49	44.2 −0.6	47.99 1.75	9.7
14.7	24.43 .72	14.8 0.6	36.76 .32	20.3 1.5	4.27 .49	45.1 1.2	49.77 1.78	8.8
24.7	25.15 .71	14.5 −0.1	37.08 .32	18.7 1.6	4.76 .48	46.6 1.8	51.56 1.77	8.4
Dec. 4.7	25.85 .68	14.6 +0.4	37.39 .31	17.2 1.6	5.23 .45	48.7 2.4	53.32 1.72	8.6
14.7	26.52 +.64	15.2 +0.8	37.69 +.29	15.6 −1.5	5.66 +.41	51.4 −2.8	54.99 1.61	9.4
24.6	27.12 .57	16.3 1.3	37.97 .26	14.2 1.4	6.04 .35	54.4 3.2	56.53 1.45	10.7
34.6	27.66 +.49	17.8 +1.8	38.21 +.23	12.9 −1.2	6.36 +.28	57.8 −3.5	57.89 1.24	12.6

APPARENT PLACES FOR THE UPPER TRANSIT AT WASHINGTON.

Mean Solar Date.	α Ursæ Majoris. Right Ascension.	α Ursæ Majoris. Declination North.	δ Leonis. Right Ascension.	δ Leonis. Declination North.	δ Crateris. Right Ascension.	δ Crateris. Declination South.	τ Leonis. Right Ascension.	τ Leonis. Declinat[ion] Nort[h].
	h m 10 56	+62° 21′	h m 11 8	+21° 8′	h m 11 13	−14° 9′	h m 11 22	+3°
	s	″	s	″	s	″	s	″
(Dec. 30.7)	41.00 +.56	39.8 −0.1	2.84 +.33	43.9 −1.5	39.01 +.30	40.4 −2.3	4.70 +.31	59.0
Jan. 9.7	41.54 .52	40.1 +0.6	3.16 .30	42.6 1.2	39.30 .28	42.7 2.3	5.00 .29	57.1
19.6	42.03 .46	41.0 1.2	3.44 .27	41.6 0.8	39.57 .25	45.0 2.3	5.28 .26	55.3
29.6	42.45 .38	42.4 1.6	3.69 .23	40.9 0.5	39.81 .21	47.3 2.2	5.52 .22	53.8
Feb. 8.6	42.79 .29	44.3 2.1	3.90 .18	40.6 −0.1	40.00 .17	49.4 2.1	5.72 .18	52.5
18.5	43.03 +.20	46.5 +2.4	4.05 +.13	40.7 +0.2	40.14 +.12	51.4 −1.8	5.88 +.13	51.5
28.5	43.18 .10	49.0 2.6	4.16 .08	41.1 0.5	40.24 .08	53.1 1.6	5.99 .09	50.8
Mar. 10.5	43.24 +.01	51.7 2.7	4.22 +.04	41.7 0.8	40.30 +.03	54.6 1.4	6.06 .05	50.4
20.5	43.20 −.08	54.4 2.7	4.23 −.01	42.6 0.9	40.31 .00	55.9 1.1	6.08 +.01	50.2
30.4	43.08 .16	57.1 2.6	4.20 .04	43.6 1.1	40.29 −.04	56.9 0.9	6.07 −.03	50.2
Apr. 9.4	42.88 −.23	59.6 +2.4	4.14 −.08	44.7 +1.1	40.24 −.07	57.7 −0.6	6.03 −.05	50.4
19.4	42.62 .28	61.8 2.1	4.05 .10	45.9 1.1	40.16 .09	58.2 0.4	5.97 .08	50.8
29.4	42.32 .32	63.7 1.7	3.94 .11	47.0 1.1	40.06 .10	58.4 −0.2	5.88 .09	51.3
May 9.3	41.99 .34	65.2 1.3	3.82 .13	48.1 1.0	39.96 .11	58.5 +0.1	5.78 .10	51.8
19.3	41.64 .35	66.3 0.8	3.69 .13	49.0 0.9	39.84 .12	58.3 0.3	5.67 .11	52.5
29.3	41.29 −.35	66.9 +0.3	3.56 −.13	49.9 +0.8	39.72 −.12	57.9 +0.5	5.56 −.11	53.2
June 8.2	40.94 .34	67.0 −0.1	3.44 .12	50.6 0.6	39.60 .12	57.4 0.6	5.44 .11	53.9
18.2	40.62 .31	66.6 0.6	3.32 .12	51.1 0.4	39.48 .12	56.6 0.8	5.33 .11	54.6
28.2	40.32 .28	65.8 1.1	3.20 .10	51.4 +0.2	39.36 .11	55.8 0.9	5.23 .10	55.3
July 8.2	40.06 .24	64.4 1.5	3.11 .09	51.6 0.0	39.26 .10	54.8 1.1	5.14 .09	55.9
18.1	39.83 −.20	62.8 −1.9	3.02 −.07	51.5 −0.1	39.17 −.08	53.7 +1.1	5.05 −.08	56.5
28.1	39.66 .15	60.7 2.2	2.96 .05	51.3 0.4	39.10 .07	52.5 1.2	4.98 .06	57.0
Aug. 7.1	39.54 .09	58.3 2.5	2.92 .03	50.8 0.6	39.04 .05	51.3 1.2	4.93 .04	57.4
17.1	39.47 −.04	55.6 2.8	2.90 −.01	50.2 0.8	39.00 −.02	50.1 1.1	4.89 −.02	57.7
27.0	39.46 +.03	52.6 3.0	2.90 +.02	49.3 1.0	38.99 .00	49.0 1.0	4.88 .00	57.8
Sept. 6.0	39.52 +.09	49.6 −3.1	2.93 +.05	48.2 −1.2	39.01 +.04	48.0 +0.9	4.90 +.03	57.8
16.0	39.64 .16	46.4 3.2	3.00 .08	46.9 1.4	39.06 .07	47.2 0.7	4.95 .07	57.5
25.9	39.83 .22	43.1 3.3	3.10 .12	45.4 1.6	39.15 .11	46.6 0.4	5.03 .10	57.0
Oct. 5.9	40.09 .29	39.8 3.2	3.24 .16	43.7 1.8	39.28 .15	46.3 +0.1	5.15 .14	56.3
15.9	40.42 .36	36.7 3.1	3.42 .20	41.9 1.9	39.45 .19	46.4 −0.2	5.30 .18	55.3
25.9	40.81 +.42	33.7 −2.9	3.64 +.23	39.8 −2.1	39.66 +.23	46.8 −0.6	5.50 +.21	54.1
Nov. 4.8	41.27 .48	30.9 2.6	3.89 .27	37.7 2.1	39.90 .26	47.5 0.9	5.73 .25	52.6
14.8	41.78 .53	28.4 2.3	4.18 .30	35.6 2.2	40.18 .29	48.6 1.3	6.00 .28	50.9
24.8	42.33 .57	26.3 1.9	4.49 .32	33.4 2.1	40.48 .31	50.0 1.6	6.29 .30	49.0
Dec. 4.8	42.91 .59	24.6 1.4	4.82 .34	31.3 2.0	40.80 .33	51.8 1.9	6.61 .32	47.0
14.7	43.51 +.60	23.5 −0.9	5.17 +.34	29.3 −1.9	41.13 +.33	53.8 −2.1	6.93 +.32	44.9
24.7	44.10 .58	22.9 −0.3	5.51 .34	27.6 1.6	41.46 .32	55.6 2.3	7.26 .32	42.8
34.7	*44.67 +.55*	22.9 +0.3	5.84 +.32	26.1 −1.3	41.77 +.30	58.3 −2.3	7.57 +.30	40.8

APPARENT PLACES FOR THE UPPER TRANSIT AT WASHINGTON.

Mean Solar Date.	η Virginis. Right Ascension.		η Virginis. Declination South.		a ... Right Ascension
	h m 12 14		° ′ − 0 1		h 12 2
	s		″		s
(Dec. 30.7)	4.40	+.30	59.5	−2.1	16.29 +
Jan. 9.7	4.71	.31	61.5	2.0	16.65
19.7	5.01	.30	63.5	1.8	17.38
29.7	5.29	.28	65.2	1.6	17.66
Feb. 8.6	5.58	.20	66.7	1.4	18.26
18.6	5.73	+.16	68.0	−1.1	18.63 +
28.6	5.89	.14	68.9	0.8	[illegible]
Mar. 10.5	6.01	.10	69.6	0.6	19.10
20.5	6.09	.06	70.0	0.3	19.23
30.5	6.13	+.03	70.2	−0.1	19.26 +
Apr. 9.5	6.14	−.01	70.2	+0.1	19.27 −
19.4	6.12	.03	70.0	0.3	19.19
29.4	6.07	.05	69.6	0.4	19.05
May 9.4	6.01	.07	69.1	0.5	[illegible]
19.4	5.93	.09	68.5	0.6	18.63
29.3	5.83	−.10	67.9	+0.7	18.36 −
June 8.3	5.74	.10	67.2	0.7	18.06
18.3	5.63	.11	66.5	0.7	17.72
28.3	5.52	.11	65.8	0.7	17.37
July 8.2	5.41	.11	65.1	0.7	17.01
18.2	5.31	−.10	64.5	+0.6	16.66 −
28.2	5.21	.09	63.9	0.6	[illegible]
Aug. 7.1	5.12	.08	63.4	0.5	16.01
17.1	5.04	.07	63.0	0.3	15.73
27.1	4.98	.04	62.7	+0.2	[illegible]
Sept. 6.1	4.95	−.02	62.5	0.0	15.34 −
16.0	4.95	+.01	62.6	−0.2	15.26 −
26.0	4.98	.05	62.9	0.4	15.24 +
Oct. 6.0	5.04	.08	63.4	0.7	[illegible]
15.9	5.15	.12	64.2	0.9	[illegible]
25.9	5.30	+.17	65.3	−1.2	15.76 +
Nov. 4.9	5.49	.21	66.6	1.4	16.09
[illegible]	5.72	.25	68.1	1.7	[illegible]
24.8	5.99	.29	69.9	1.9	17.01
Dec. 4.8	6.28	.30	71.9	2.0	17.55
14.8	6.60	+.32	73.9	−2.1	18.12 +
24.8	6.92	.32	76.1	2.1	18.70
34.7	7.25	+.32	78.2	−2.0	19.27 +

APPARENT PLACES FOR THE UPPER TRANSIT AT WASHINGTON.

Mean Solar Date.	32ᶦ Camelop. (H.)		α Can. Venaticorum.		θ Virginis.		α Virginis. (Spica.)	
	Right Ascension.	Declination North.	Right Ascension.	Declination North.	Right Ascension.	Declination South.	Right Ascension.	Declination South.
	h m 12 48	° ′ +84 1	h m 12 50	° ′ +38 55	h m 13 4	° ′ − 4 55	h m 13 19	° ′ −10 33
	s	″	s	″	s	″	s	″
(Dec. 30.8)	11.18+2.20	39.8 −0.9	40.93 +.38	52.2 −1.8	2.57 +.32	44.6 −2.0	10.95 +.32	51.2 −1.9
Jan. 9.7	13.40 2.21	39.2 −0.2	41.32 .38	50.6 1.4	2.90 .31	46.7 2.0	11.27 .32	53.2 2.0
19.7	15.60 2.16	39.4 +0.5	41.69 .36	49.5 0.8	3.21 .30	48.7 1.9	11.59 .31	55.2 1.9
29.7	17.71 2.02	40.2 1.1	42.04 .34	48.9 −0.3	3.51 .28	50.5 1.8	11.90 .29	57.1 1.8
Feb. 8.6	19.65 1.82	41.6 1.7	42.36 .30	48.9 +0.3	3.78 .26	52.2 1.6	12.18 .26	58.9 1.7
18.6	21.35+1.54	43.5 +2.2	42.65 +.26	49.4 +0.7	4.02 +.22	53.7 −1.3	12.43 +.23	60.6 −1.5
28.6	22.74 1.21	46.0 2.6	42.88 .21	50.3 1.2	4.22 .19	54.9 1.1	12.65 .20	62.0 1.3
Mar. 10.6	23.78 .85	48.8 3.0	43.07 .16	51.7 1.6	4.39 .15	55.9 0.8	12.83 .16	63.3 1.1
20.5	24.45 .47	51.8 3.1	43.20 .11	53.4 1.9	4.52 .11	56.6 0.6	12.97 .13	64.3 0.9
30.5	24.72+ .08	55.0 3.2	43.28 .06	55.4 2.1	4.61 .08	57.1 0.3	13.09 .09	65.1 0.7
Apr. 9.5	24.61− .30	58.2 +3.1	43.32 +.01	57.6 +2.2	4.67 +.05	57.3 −0.1	13.16 +.06	65.6 −0.5
19.5	24.11 .66	61.2 2.9	43.31 −.03	59.8 2.2	4.70 +.02	57.3 0.0	13.21 +.03	66.0 0.3
29.4	23.28 .99	64.1 2.7	43.26 .06	62.0 2.2	4.70 −.01	57.2 +0.2	13.22 .00	66.2 −0.1
May 9.4	22.13 1.28	66.6 2.3	43.18 .09	64.2 2.0	4.68 .03	56.9 0.3	13.22 −.02	66.2 0.0
19.4	20.72 1.52	68.7 1.9	43.08 .12	66.1 1.8	4.64 .05	56.5 0.4	13.19 .04	66.1 +0.2
29.3	19.10−1.70	70.3 +1.4	42.94 −.14	67.8 +1.6	4.57 −.07	56.0 +0.5	13.14 −.06	65.8 +0.3
June 8.3	17.32 1.83	71.4 0.8	42.80 .16	69.3 1.3	4.50 .09	55.4 0.6	13.06 .08	65.5 0.4
18.3	15.44 1.90	72.0 +0.3	42.63 .17	70.4 0.9	4.40 .10	54.8 0.6	12.98 .10	65.0 0.5
28.3	13.52 1.93	71.9 −0.3	42.46 .17	71.1 0.6	4.30 .11	54.2 0.7	12.88 .11	64.5 0.6
July 8.2	11.59 1.90	71.4 0.8	42.29 .17	71.5 +0.2	4.19 .11	53.5 0.7	12.76 .12	63.9 0.6
18.2	9.72−1.83	70.3 −1.4	42.12 −.17	71.5 −0.2	4.07 −.12	52.9 +0.7	12.64 −.12	63.2 +0.7
28.2	7.94 1.71	68.7 1.8	41.95 .16	71.1 0.6	3.95 .12	52.2 0.6	12.52 .13	62.5 0.7
Aug. 7.2	6.30 1.55	66.6 2.3	41.79 .15	70.4 0.9	3.84 .11	51.6 0.6	12.39 .13	61.8 0.7
17.1	4.83 1.37	64.0 2.7	41.65 .13	69.2 1.3	3.73 .10	51.1 0.5	12.27 .12	61.1 0.7
27.1	3.57 1.14	61.1 3.1	41.53 .11	67.8 1.6	3.63 .09	50.6 0.4	12.16 .10	60.5 0.6
Sept. 6.1	2.53− .90	57.9 −3.4	41.43 −.08	65.9 −2.0	3.55 −.07	50.2 +0.3	12.07 −.08	59.9 +0.5
16.0	1.77 .62	54.4 3.6	41.37 −.04	63.8 2.3	3.50 −.04	50.1 +0.1	12.00 .05	59.4 0.3
26.0	1.29 .33	50.7 3.7	41.34 .00	61.4 2.5	3.48 .00	50.1 −0.1	11.97 −.02	59.1 +0.2
Oct. 6.0	1.11− .01	46.9 3.8	41.36 +.04	58.7 2.7	3.50 +.04	50.3 0.3	11.97 +.02	59.0 0.0
16.0	1.26+ .31	43.1 3.8	41.43 .09	55.9 2.9	3.56 .08	50.7 0.6	12.01 .07	59.1 −0.2
25.9	1.74+ .64	39.3 −3.7	41.55 +.15	52.9 −3.0	3.66 +.13	51.5 −0.9	12.10 +.11	59.5 −0.5
Nov. 4.9	2.54 .97	35.7 3.5	41.72 .20	49.8 3.1	3.81 .17	52.5 1.1	12.24 .16	60.1 0.8
14.9	3.67 1.28	32.3 3.2	41.94 .25	46.7 3.1	4.00 .21	53.7 1.4	12.42 .20	61.0 1.1
24.9	5.10 1.56	29.2 2.9	42.21 .29	43.7 2.9	4.24 .25	55.2 1.6	12.66 .24	62.2 1.3
Dec. 4.8	6.80 1.82	26.5 2.4	42.53 .32	40.8 2.7	4.51 .28	56.9 1.8	12.92 .28	63.7 1.6
14.8	8.73+2.02	24.4 −1.9	42.88 +.36	38.2 −2.5	4.81 +.31	58.8 −1.9	13.21 +.30	65.3 −1.8
24.8	10.83 2.16	22.8 1.3	43.25 .38	35.9 2.1	5.12 .32	60.8 2.0	13.53 .32	67.2 1.9
34.7	13.04+2.23	21.8 −0.7	43.64 +.39	34.0 −1.6	5.45 +.32	62.9 −2.1	13.86 +.33	69.1 −2.0

APPARENT PLACES FOR THE UPPER TRANSIT AT WASHINGTON.

Mean Solar Date.	A
Dec. 30.8)	52.
Jan. 9.8	52.
19.7	53.
29.7	53.
Feb. 8.7	53.
18.7	54
28.6	54
Mar. 10.6	54
20.6	54
30.5	54
Apr. 9.5	54
19.5	54.
29.5	54.
May 9.4	54
19.4	54
29.4	54
June 8.4	54
18.3	54
[illegible]	54
July 8.3	54
18.2	54.
28.2	54
Aug. 7.2	54.
17.2	53.
27.1	53.
Sept. 6.1	53.
16.1	53.
26.1	53
Oct. 6.0	53.
16.0	[illegible]
26.0	53.
Nov. 5.0	53.
14.9	54
24.9	54.
Dec. 4.9	54.
[illegible]	54.
24.8	55.
34.8	55.

APPARENT PLACES FOR THE UPPER TRANSIT AT WASHINGTON.

Mean Solar Date.	5 Ursæ Minoris.		α^2 Centauri.		ϵ Bootis.		α^2 Libræ.	
	Right Ascension.	Declination *North.*	Right Ascension.	Declination *South.*	Right Ascension.	Declination *North.*	Right Ascension.	Declination *South.*
	h m 14 27	° ′ +76 11	h m 14 31	° ′ −60 21	h m 14 39	° ′ +27 33	h m 14 44	° ′ −15 33
	s	″	s	″	s	″	s	″
ec. 30.8	41.82 +.76	58.7 −2.3	52.20 +.53	39.5 +0.1	59.38 +.31	16.5 −2.6	33.54 +.31	52.4 −1.5
n. 9.8	42.72 .93	56.6 1.8	52.74 .55	39.6 −0.4	59.70 .32	14.1 2.2	33.86 .32	53.9 1.6
19.8	43.68 .96	55.2 1.1	53.30 .56	40.3 0.9	60.03 .33	12.0 1.8	34.18 .32	55.5 1.6
29.7	44.67 .99	54.4 −0.5	53.85 .54	41.4 1.3	60.36 .33	10.3 1.4	34.31 .32	57.1 1.6
eb. 8.7	45.66 .97	54.2 +0.2	54.39 .52	43.0 1.7	60.69 .32	9.2 0.9	34.82 .31	58.7 1.5
18.7	46.62 +.92	54.8 +0.9	54.90 +.49	44.8 −2.0	61.00 +.30	8.5 −0.4	35.12 +.29	60.2 −1.4
28.7	47.50 .83	56.0 1.5	55.37 .45	47.0 2.3	61.29 .27	8.3 +0.1	35.40 .27	61.6 1.3
ar. 10.6	48.28 .72	57.8 2.0	55.79 .40	49.5 2.5	61.55 .24	8.7 0.6	35.65 .24	62.8 1.1
20.6	48.93 .58	60.1 2.5	56.16 .34	52.1 2.7	61.77 .21	9.5 1.0	35.87 .21	63.9 1.0
30.6	49.44 .43	62.8 2.8	56.48 .29	54.8 2.8	61.96 .17	10.7 1.4	36.07 .18	64.8 0.8
pr. 9.5	49.80 +.28	65.8 +3.1	56.74 +.23	57.6 −2.8	62.12 +.14	12.3 +1.7	36.24 +.15	65.4 −0.6
19.5	50.00 +.12	68.9 3.2	56.94 .17	60.4 2.8	62.24 .10	14.1 1.9	36.37 .12	66.0 0.4
29.5	50.03 −.04	72.1 3.2	57.08 .11	63.1 2.7	62.32 .07	16.1 2.1	36.48 .09	66.3 0.3
ay 9.5	49.91 .20	75.3 3.1	57.15 +.05	65.8 2.6	62.37 +.03	18.2 2.1	36.55 .06	66.5 −0.2
19.4	49.64 .34	78.2 2.9	57.17 −.01	68.3 2.4	62.39 .00	20.4 2.1	36.60 .03	66.6 0.0
29.4	49.23 −.46	81.0 +2.5	57.12 −.06	70.6 −2.2	62.37 −.03	22.5 +2.0	36.62 +.01	66.6 +0.1
ne 8.4	48.71 .58	83.3 2.1	57.02 .13	72.7 1.9	62.33 .06	24.4 1.9	36.61 −.02	66.5 0.2
18.4	48.08 .67	85.3 1.7	56.86 .18	74.4 1.6	62.25 .09	26.2 1.7	36.58 .05	66.3 0.2
28.3	47.36 .75	86.7 1.2	56.64 .24	75.8 1.2	62.15 .11	27.7 1.4	36.51 .08	66.0 0.3
ly 8.3	46.58 .80	87.7 0.7	56.38 .28	76.9 0.8	62.03 .13	29.0 1.1	36.43 .10	65.7 0.4
18.3	45.75 −.83	88.2 +0.2	56.08 −.32	77.5 −0.4	61.88 −.15	30.0 +0.8	36.31 −.12	65.3 +0.4
28.3	44.90 .86	88.1 −0.3	55.74 .34	77.7 0.0	61.72 .17	30.6 0.5	36.18 .14	64.9 0.5
g. 7.2	44.04 .85	87.5 0.9	55.39 .36	77.5 +0.5	61.55 .17	30.9 +0.1	36.04 .15	64.4 0.5
17.2	43.19 .83	86.3 1.4	55.03 .36	76.8 0.9	61.37 .18	30.9 −0.2	35.89 .15	63.8 0.6
27.2	42.38 .79	84.7 1.9	54.67 .34	75.7 1.3	61.20 .17	30.5 0.6	35.73 .15	63.3 0.5
pt. 6.1	41.62 −.72	82.6 −2.3	54.34 −.31	74.2 +1.7	61.03 −.16	29.8 −0.9	35.58 −.14	62.7 +0.5
16.1	40.93 .64	80.1 2.7	54.05 .27	72.4 2.0	60.87 .14	28.6 1.3	35.45 .12	62.2 0.5
26.1	40.34 .54	77.1 3.1	53.81 .21	70.3 2.2	60.74 .11	27.2 1.6	35.34 .10	61.8 0.4
t. 6.1	39.85 .42	73.9 3.4	53.63 .14	68.0 2.3	60.64 .08	25.4 1.9	35.26 .06	61.4 0.3
16.0	39.50 .26	70.3 3.6	53.54 −.05	65.6 2.4	60.59 −.04	23.3 2.2	35.22 −.02	61.2 +0.1
26.0	39.29 −.13	66.6 −3.8	53.53 +.04	63.2 +2.4	60.57 +.01	21.0 −2.5	35.23 +.03	61.2 −0.1
v. 5.0	39.23 +.03	62.8 3.8	53.61 .13	60.9 2.2	60.61 .05	18.3 2.7	35.28 .06	61.3 0.3
15.0	39.34 .19	58.9 3.8	53.79 .23	58.8 2.0	60.70 .11	15.5 2.9	35.39 .12	61.7 0.5
24.9	39.62 .36	55.1 3.7	54.06 .31	57.0 1.6	60.84 .17	12.6 3.0	35.55 .18	62.4 0.8
ec. 4.9	40.06 .51	51.5 3.4	54.42 .39	55.5 1.2	61.03 .22	9.6 3.0	35.75 .23	63.3 1.0
14.9	40.65 +.66	48.3 −3.1	54.84 +.45	54.4 +0.6	61.27 +.26	6.7 −2.9	36.00 +.26	64.4 −1.2
24.8	41.38 .79	45.3 2.7	55.33 .50	53.9 +0.3	61.55 .29	3.8 2.7	36.28 .29	65.7 1.4
34.8	42.22 +.88	42.9 −2.1	55.85 +.54	53.8 −0.2	61.86 +.32	1.2 −2.5	36.59 +.32	67.2 −1.5

APPARENT PLACES FOR THE UPPER TRANSIT AT WASHINGTON.

Mean Solar Date.	β Ursæ Minoris. Right Ascension.	β Ursæ Minoris. Declination North.	β Bootis. Right Ascension.	β Bootis. Declination North.	β Libræ. Right Ascension.	β Libræ. Declination South.	μ¹ Bootis. Right Ascension.	μ¹ Bootis. Declination North.
	h m 14 50	° ′ +74 36	h m 14 57	° ′ +40 50	h m 15 10	° ′ − 8 57	h m 15 20	+37
	s	″	s	″	s	″	s	″
(Dec. 30.8)	58.22 +.72	67.5 −2.6	37.59 +.32	21.6 −2.8	51.41 +.28	33.0 −1.6	9.49 +.29	36.
Jan. 9.8	58.96 .80	65.1 2.1	37.92 .35	19.0 2.4	51.71 .30	34.6 1.6	9.80 .32	33.
19.8	59.83 .86	63.4 1.5	38.28 .36	16.8 1.9	52.02 .31	36.3 1.6	10.14 .34	31.
29.8	60.71 .89	62.2 0.8	38.65 .37	15.1 1.4	52.33 .31	37.8 1.5	10.49 .35	29.
Feb. 8.7	61.61 .89	61.8 −0.1	39.02 .36	14.0 0.8	52.64 .30	39.3 1.4	10.84 .36	28.
18.7	62.49 +.86	62.0 +0.6	39.38 +.34	13.5 −0.2	52.94 +.29	40.6 −1.2	11.19 +.34	27.
28.7	63.32 .79	62.9 1.2	39.71 .32	13.6 +0.4	53.22 .27	41.8 1.0	11.52 .32	27.
Mar. 10.7	64.07 .70	64.4 1.8	40.02 .29	14.2 0.9	53.48 .25	42.7 0.8	11.83 .29	27.
20.6	64.72 .59	66.4 2.3	40.29 .25	15.4 1.4	53.72 .22	43.4 0.6	12.11 .26	28
30.6	65.25 .47	68.9 2.7	40.52 .21	17.1 1.9	53.93 .20	43.9 0.4	12.35 .23	30
Apr. 9.6	65.65 +.33	71.8 +2.9	40.71 +.17	19.1 +2.2	54.12 +.17	44.1 −0.2	12.56 +.19	31
19.5	65.91 .19	74.8 3.1	40.85 .12	21.5 2.5	54.27 .14	44.2 0.0	12.72 .15	34
29.5	66.03 +.05	78.0 3.2	40.95 .08	24.0 2.6	54.40 .11	44.1 +0.2	12.85 .11	36
May 9.5	66.00 −.09	81.2 3.1	41.01 +.04	26.7 2.7	54.50 .09	43.9 0.3	12.94 .07	39
19.5	65.84 .23	84.3 3.0	41.03 .00	29.4 2.6	54.57 .06	43.5 0.4	12.99 +.03	41
29.4	65.55 −.35	87.2 +2.7	41.01 −.04	32.0 +2.5	54.61 +.03	43.1 +0.4	12.99 −.01	44
June 8.4	65.14 .46	89.8 2.4	40.94 .08	34.4 2.3	54.62 .00	42.6 0.5	12.96 .05	46
18.4	64.63 .55	92.0 2.0	40.85 .11	36.5 2.0	54.61 −.03	42.1 0.5	12.89 .09	49
28.4	64.04 .63	93.8 1.5	40.72 .14	38.4 1.7	54.56 .06	41.6 0.5	12.79 .12	51
July 8.3	63.37 .70	95.1 1.0	40.56 .17	40.0 1.4	54.49 .09	41.1 0.5	12.65 .15	5[illegible]
18.3	62.64 −.74	95.9 +0.5	40.37 −.19	41.1 +1.0	54.39 −.11	40.6 +0.5	12.49 −.18	54
28.3	61.88 .77	96.2 0.0	40.17 .21	41.9 0.5	54.27 .13	40.1 0.5	12.30 .20	5[illegible]
Aug. 7.2	61.09 .78	95.9 −0.5	39.95 .22	42.2 +0.1	54.13 .14	39.6 0.5	12.09 .21	5[illegible]
17.2	60.31 .78	95.1 1.0	39.72 .23	42.1 −0.3	53.98 .15	39.1 0.4	11.87 .22	5[illegible]
27.2	59.54 .75	93.8 1.5	39.49 .23	41.5 0.8	53.82 .16	38.7 0.4	11.65 .22	5[illegible]
Sept. 6.2	58.81 −.70	92.0 −2.0	39.27 −.22	40.5 −1.2	53.67 −.15	38.4 +0.3	11.42 −.22	54
16.1	58.13 .64	89.8 2.5	39.06 .19	39.1 1.6	53.52 .14	38.2 0.2	11.21 .20	5[illegible]
26.1	57.53 .56	87.1 2.9	38.88 .16	37.3 2.0	53.40 .11	38.0 +0.1	11.02 .18	5[illegible]
Oct. 6.1	57.02 .45	84.1 3.2	38.73 .13	35.1 2.4	53.30 .08	38.0 −0.1	10.86 .14	50
16.1	56.62 .34	80.7 3.5	38.62 .08	32.5 2.7	53.23 −.04	38.2 0.2	10.73 .10	47
26.0	56.34 −.20	77.1 −3.7	38.57 −.03	29.6 −3.0	53.21 .00	38.5 −0.4	10.66 −.05	4[illegible]
Nov. 5.0	56.21 −.06	73.4 3.8	38.57 +.03	26.5 3.2	53.24 +.05	39.0 0.6	10.63 .00	4[illegible]
15.0	56.22 +.09	69.5 3.8	38.63 .09	23.2 3.4	53.32 .10	39.8 0.9	10.66 +.06	3[illegible]
25.0	56.39 .24	65.7 3.8	38.75 .15	19.8 3.4	53.44 .15	40.8 1.1	10.76 .12	3[illegible]
Dec. 4.9	56.71 .39	62.0 3.6	38.93 .21	16.4 3.4	53.62 .20	42.0 1.3	10.90 .18	3[illegible]
14.9	57.17 +.53	58.5 −3.3	39.16 +.26	13.0 −3.3	53.84 +.24	43.3 −1.4	11.11 +.23	2[illegible]
24.9	57.77 .65	55.4 2.9	39.44 .30	9.9 3.0	54.09 .27	44.8 1.6	11.36 .27	2[illegible]
34.8	58.48 +.76	52.7 −2.4	39.76 +.34	7.0 −2.7	54.38 +.29	46.4 −1.6	11.65 +.31	2[illegible]

APPARENT PLACES FOR THE UPPER TRANSIT AT WASHINGTON.

Mean Solar Date.	η Draconis. Right Ascension.	η Draconis. Declination North.	β Herculis. Right Ascension.	β Herculis. Declination North.	A Draconis. Right Ascension.	A Draconis. Declination North.	ζ Ophiuchi. Right Ascension.	ζ Ophiuchi. Dec. S.
	h m 16 22	° ′ +61 46	h m 16 25	° ′ +21 44	h m 16 28	° ′ +69 0	h m 16 30	−1
	s	″	s	″	s	″	s	″
(Dec. 30.9)	24.10 +.30	19.2 −3.4	17.70 +.23	23.1 −2.7	8.86 +.38	51.2 −3.4	51.60 +.23	57.
Jan. 9.9	24.44 .37	15.9 3.1	17.94 .25	20.4 2.5	9.26 .46	47.9 3.1	51.85 .23	58.
19.8	24.85 .40	13.1 2.6	18.21 .28	18.1 2.2	9.75 .50	45.0 2.6	52.12 .28	59.
29.8	25.31 .49	10.7 2.1	18.50 .30	16.0 1.9	10.31 .59	42.7 2.1	52.41 .30	61.
Feb. 8.8	25.80 .51	8.9 1.5	18.80 .30	14.2 1.5	10.93 .64	40.9 1.5	52.71 .30	62.
18.8	26.32 +.52	7.8 −0.8	19.10 +.30	13.0 −1.0	11.59 +.66	39.7 −0.8	53.02 +.30	63.
28.7	26.84 .51	7.3 −0.1	19.41 .30	12.2 0.6	12.25 .66	39.2 −0.1	53.32 .30	64.
Mar. 10.7	27.35 .49	7.3 +0.3	19.70 .29	11.9 −0.1	12.91 .62	39.4 +0.6	53.61 .29	64.
20.7	27.83 .46	8.4 1.2	19.98 .27	12.0 +0.4	13.53 .59	40.3 1.2	53.89 .27	65.
30.7	28.27 .42	9.8 1.7	20.24 .25	12.7 0.9	14.10 .51	41.8 1.8	54.15 .25	65.
Apr. 9.6	28.66 +.38	11.9 +2.2	20.48 +.22	13.7 +1.2	14.61 +.45	43.8 +2.2	54.40 +.22	65.
19.6	29.02 .30	14.3 2.6	20.70 .20	15.2 1.6	15.06 .38	46.3 2.7	54.62 .21	65.
29.6	29.32 .24	17.2 2.9	20.88 .17	16.9 1.9	15.38 .28	49.2 3.0	54.82 .19	65.
May 9.5	29.48 .16	20.2 3.1	21.04 .14	18.9 2.0	15.63 .19	52.3 3.2	55.00 .16	64.
19.5	29.78 .08	23.5 3.3	21.16 .11	21.0 2.1	15.77 +.08	55.5 3.3	55.14 .13	64.
29.5	29.83 −.01	26.7 +3.3	21.25 −.07	23.2 +2.2	15.84 −.02	58.8 +3.3	55.26 +.10	[illegible]
June 8.5	29.80 −.08	29.9 [illegible]	21.31 −.04	25.3 [illegible]	15.73 .11	62.0 [illegible]	55.35 .07	[illegible]
18.4	29.70 .14	33.0 3.1	21.33 .00	27.5 2.1	15.59 .18	65.1 3.1	55.41 +.02	[illegible]
28.4	29.52 .20	35.7 2.6	21.31 −.02	29.4 [illegible]	15.34 .22	67.9 2.7	55.42 .00	[illegible]
July 8.4	29.26 .27	38.1 2.2	21.26 .05	31.2 1.7	15.00 .38	70.4 2.3	55.40 −.04	[illegible]
18.4	[illegible] −.32	40.2 [illegible]	21.17 −.09	32.5 −1.3	14.55 −.45	72.5 [illegible]	55.34 −.07	[illegible]
28.4	[illegible]	41.5 [illegible]	21.16 .12	[illegible]	14.10 .52	74.2 [illegible]	55.25 .09	[illegible]
Aug. 7.3	[illegible]	43.0 [illegible]	20.91 [illegible]	35.2 [illegible]	[illegible]	75.4 [illegible]	[illegible]	[illegible]
17.3	27.88 [illegible]	43.7 [illegible]	20.73 [illegible]	35.3 [illegible]	[illegible]	76.1 −0.3	55.00 [illegible]	[illegible]
27.2	27.06 [illegible]	43.3 [illegible]	20.55 [illegible]	36.3 [illegible]	[illegible]	76.3 [illegible]	54.87 [illegible]	[illegible]
Sept. 6.2	[illegible]	43.5 [illegible]	20.35 [illegible]	[illegible]	11.73 [illegible]	76.0 [illegible]	54.66 [illegible]	[illegible]
16.2	[illegible]	42.7 [illegible]	[illegible]	[illegible]	11.22 [illegible]	75.2 [illegible]	54.48 .6	[illegible]
26.2	[illegible]	[illegible]	[illegible]	[illegible]	10.72 [illegible]	[illegible]	54.32 .6	[illegible]
Oct. [illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	54.16 [illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	69.6 [illegible]	54.04 [illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	53.85 [illegible]	[illegible]
Nov. [illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	53.80 [illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	53.81 [illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	56.7 [illegible]	53.85 [illegible]	[illegible]
Dec. [illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	54.05 [illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

APPARENT PLACES FOR THE UPPER TRANSIT AT WASHINGTON.

Mean Solar Date.	α Trianguli Australis.				η Herculi			
	Right Ascension.		Declination South.		Right Ascension.		Dec	
	h m 16 36		−68° 48′		h m 16 38		+	
	s		″		s			
ec.30.9)	33.16	+.59	40.5	+1.7	57.44	+.31	2	
.n. 9.9	33.76	.61	38.9	1.5	57.67	.28	2	
19.9	34.40	.67	37.6	1.1	57.95	.29	1	
29.8	35.10	.72	36.6	0.4	58.26	.32	1	
·b. 8.8	35.83	.75	36.4	+0.2	58.60	.34	1	
18.8	36.59	+.76	36.4	−0.2	58.94	+.34	1	
28.8	37.35	.75	36.8	0.6	59.28	.34	1	
ar. 10.7	38.09	.73	37.6	1.0	59.62	.32	1	
20.7	38.81	.70	38.7	1.3	59.94	.32	1	
30.7	39.49	.66	40.2	1.6	60.25	.29	1	
·r. 9.6	40.13	+.60	42.0	−1.9	60.53	+.26	1	
19.6	40.71	.54	44.1	2.1	60.78	.22	1	
29.6	41.22	.47	46.3	2.3	60.99	.20	1	
·y 9.6	41.65	.39	48.7	2.5	61.17	.16	2	
19.5	42.01	.31	51.3	2.6	61.31	.12	2	
[illegible]	42.27	+.22	53.9	−2.6	61.40	+.07	2	
ne 8.5	42.44	.12	56.5	2.6	61.45	+.02	2	
18.5	42.51	+.03	59.1	2.5	61.46	−.02	3	
28.4	42.48	−.06	61.5	2.4	61.42	.06	3	
ly 8.4	42.35	.16	63.8	2.1	61.34	.10	3	
18.4	42.12	−.27	65.8	−1.8	61.22	−.14	3	
28.3	41.81	.35	67.5	1.5	61.06	.18	4	
ıg. 7.3	41.42	.42	68.8	1.1	60.86	.21	4	
17.3	40.96	.47	69.7	0.7	60.64	.23	4	
27.3	40.46	.51	70.2	−0.3	60.40	.25	4	
pt. 6.2	39.93	−.53	70.2	+0.2	60.15	−.26	4	
[illegible]	39.41	.53	69.7	0.7	59.89	.26	4	
26.2	38.90	.49	68.8	1.2	59.64	.25	4	
t. 6.2	38.44	.43	67.4	1.6	59.41	.22	4	
16.1	38.04	.35	65.6	1.9	59.21	.19	3	
26.1	37.74	−.26	63.5	+2.2	59.04	−.15	3	
·v. 5.1	37.54	.14	61.6	2.4	58.92	.10	3	
15.0	37.47	−.01	58.6	2.5	58.85	−.04	3	
25.0	37.51	+.11	56.1	2.5	58.84	+.02	2	
·c. 5.0	37.69	.24	53.6	2.4	58.89	.08	2	
15.0	37.90	+.36	51.3	+2.2	58.99	+.13	2	
24.9	38.41	.47	49.1	2.0	59.16	.19	1	
34.9	38.93	+.56	47.3	+1.7	59.37	+.24	1	

APPARENT PLACES FOR THE UPPER TRANSIT AT WASHINGTON.

APPARENT PLACES FOR THE UPPER TRANSIT AT WASHINGTON.

Mean Solar Date.	[illegible] Right Ascension.	[illegible] Declination North.	[illegible] Sagittarii. Right Ascension.	[illegible] Sagittarii. Declination South.	μ Sagittarii. Right Ascension.	μ Sagittarii. Declination South.	η Serpentis. Right Ascension.	η Serpentis. Declination South.
	h m 17 38	[illegible]	h m 17 38	−30 25	h m 18 6	−21 5	h m 18 15	− 2
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	35.11	6.1	21.15 +.13	30.1
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	6.3	23.30	31.4
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	35.75	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	7.1	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	34.46	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

APPARENT PLACES FOR THE UPPER TRANSIT AT WASHINGTON.

...ilm.	
Declination South.	
− 7° 16′	
41″.7	−0.8
42.5	0.8
43.3	0.8
44.0	0.7
44.6	−0.5
45.1	−0.4
45.4	−0.2
45.4	+0.1
45.2	0.3
44.8	0.5
44.2	+0.7
43.4	0.9
42.4	1.1
41.2	1.2
40.0	1.3
38.7	+1.3
37.4	1.3
36.1	1.2
35.0	1.1
33.9	1.0
33.0	+0.8
32.2	0.7
31.5	0.5
31.1	0.4
30.7	0.3
30.6	+0.1
[illegible]	0.0
30.6	−0.1
30.8	0.2
31.0	0.3
31.4	−0.4
31.9	0.5
32.4	0.6
33.0	0.7
33.7	0.7
34.5	−0.8
35.3	0.8
36.2	−0.8

APPARENT PLACES FOR THE UPPER TRANSIT AT WASHINGTON.

Mean Solar Date.	γ Aquilæ. Right Ascension.	γ Aquilæ. Declination North.	α Aquilæ. (*Altair.*) Right Ascension.	α Aquilæ. (*Altair.*) Declination North.	ε Draconis. Right Ascension.	ε Draconis. Declination North.	β Aquilæ. Right Ascension.	β Aquilæ. Declination North.
	h m 19 40	° ′ +10 20	h m 19 45	° ′ + 8 34	h m 19 48	° ′ +69 58	h m 19 49	° + 6
	s	″	s	″	s	″	s	″
Jan. 0.0	48.97 +.04	17.8 −1.6	11.85 +.04	12.0 −1.7	30.20 −.19	52.8 −3.3	41.30 +.03	28.8
10.0	49.03 .08	16.0 1.8	11.91 .06	10.4 1.7	30.07 −.06	49.4 3.4	41.44 .07	27.9
20.0	49.12 .11	14.3 1.7	12.00 .11	8.7 1.6	30.05 +.04	45.9 3.5	41.53 .10	25.7
30.0	49.25 .14	12.6 1.6	12.13 .14	7.1 1.5	30.16 .16	42.4 3.4	41.65 .14	24.3
Feb. 8.9	49.41 .17	11.0 1.4	12.29 .17	5.7 1.4	30.38 .29	39.1 3.2	41.81 .17	22.9
18.9	49.60 +.20	9.7 −1.1	12.47 +.20	4.5 −1.1	30.71 +.38	36.0 −2.9	41.99 +.19	21.8
28.9	49.82 .20	8.7 0.8	12.68 .22	3.5 0.8	31.14 .47	33.3 2.6	42.20 .22	21.0
Mar. 10.9	50.05 .24	8.0 0.5	12.92 .24	2.9 0.4	31.66 .56	31.1 1.9	42.43 .24	20.4
20.8	50.30 .26	7.7 −0.1	13.17 .26	2.7 −0.1	32.26 .63	29.5 1.3	42.68 .26	20.2
30.8	50.57 .27	7.8 +0.3	13.44 .27	2.8 +0.3	32.95 .68	28.5 0.6	42.94 .27	20.4
Apr. 9.8	50.86 +.28	8.2 +0.6	13.72 +.28	3.3 +0.7	33.54 +.67	28.1 −0.1	43.22 +.28	20.8
19.7	51.14 .29	9.0 1.0	14.00 .29	4.1 1.0	34.21 .67	28.4 +0.6	43.50 .28	21.7
29.7	51.43 .29	10.2 1.3	14.29 .29	5.3 1.3	34.87 .64	29.3 1.2	43.79 .28	22.8
May 9.7	51.71 .27	11.7 1.6	14.58 .28	6.7 1.6	35.50 .60	30.8 1.8	44.07 .28	24.2
19.7	51.98 .26	13.4 1.8	14.85 .27	8.4 1.8	36.06 .53	32.8 2.2	44.35 .27	25.8
29.6	52.24 +.24	15.3 +2.0	15.11 +.25	10.2 +1.9	36.52 +.46	35.3 +2.7	44.61 +.25	27.6
June 8.6	52.47 .22	17.3 2.0	15.35 .22	12.2 2.0	37.13 .39	38.2 2.9	44.85 .22	29.5
18.6	52.65 .19	19.4 2.1	15.56 .19	14.2 2.0	37.17 .30	41.4 3.2	45.07 .20	31.4
28.6	52.85 .15	21.5 2.1	15.74 .16	16.3 2.0	37.50 .18	44.8 3.4	45.25 .16	33.3
July 8.5	53.05 .12	23.5 2.0	15.87 .12	18.2 1.9	37.74 −.07	48.2 3.5	45.39 .12	35.1
18.5	53.17 +.07	25.4 +1.8	15.97 +.08	20.1 +1.8	37.76 −.02	51.8 +3.5	45.49 +.08	36.8
28.5	53.19 +.03	27.2 1.7	16.03 +.03	21.8 1.6	37.67 .14	55.3 3.4	45.55 +.04	38.3
Aug. 7.4	53.18 −.02	28.8 1.5	16.03 −.01	23.3 1.4	37.47 .26	58.6 3.3	45.57 −.01	39.7
17.4	53.15 .06	30.1 1.3	16.00 .05	24.6 1.2	37.17 .35	61.7 3.0	45.54 .05	40.9
27.4	53.09 .09	31.3 1.1	15.93 .09	25.7 1.0	36.78 .44	64.5 2.7	45.47 .09	41.9
Sept. 6.4	52.98 −.13	32.3 +0.9	15.82 −.13	26.5 +0.7	36.30 −.51	67.0 +2.3	45.36 −.12	42.6
16.3	52.84 .16	33.0 0.5	15.69 .15	27.2 0.5	35.76 .57	69.1 1.9	45.22 .15	43.2
26.3	52.67 .17	33.3 +0.2	15.54 .17	27.6 +0.2	35.15 .63	70.8 1.4	45.06 .17	43.4
Oct. 6.3	52.49 .18	33.4 0.0	15.34 .18	27.7 0.0	34.51 .66	71.9 0.9	44.89 .18	43.5
16.3	52.31 .18	33.3 −0.3	15.16 .18	27.6 −0.2	33.84 .67	72.6 +0.4	44.71 .18	43.3
26.2	52.13 −.17	32.9 −0.6	14.98 −.17	27.3 −0.5	33.17 −.66	72.7 −0.2	44.54 −.17	42.9
Nov. 5.2	51.96 .15	32.3 0.8	14.82 .15	26.8 0.7	32.52 .64	72.2 0.7	44.38 .15	42.4
15.2	51.82 .13	31.4 1.1	14.68 .13	25.7 1.1	31.89 .60	71.2 1.3	44.24 .13	41.6
25.1	51.69 .10	30.2 1.3	14.57 .10	24.7 1.3	31.31 .55	69.6 1.8	44.13 .10	40.5
Dec. 5.1	51.58 .06	28.8 1.6	14.48 .06	23.4 1.6	30.83 .46	67.5 2.3	44.05 .06	39.3
15.1	51.49 −.03	27.3 −1.8	14.42 −.03	21.9 −1.8	30.41 −.36	65.0 −2.8	44.00 −.03	38.0
25.0	51.49 +.01	25.5 [illegible]	14.44 +.01	20.4 [illegible]	30.1 [illegible] .26	62.0 3.1	44.00 +.00	36.5
35.0	51.52 +.05	23.6 −2.0	14.47 +.05	18.7 −2.0	29.89 −.14	58.7 −3.4	44.03 +.05	35.0

APPARENT PLACES FOR THE UPPER TRANSIT AT WASHINGTON.

Mean Solar Date.	γ Cygni. Right Ascension.	γ Cygni. Declination *North.*	π Capricorni. Right Ascension.	π Capricorni. Declination *South.*	ε Delphini. Right Ascension.	ε Delphini. Declination *North.*	Groombridge 3241. Right Ascension.	Groombridge 3241. Declination *North.*
	h m 20 18	° ′ +39 53	h m 20 20	° ′ −18 34	h m 20 27	° ′ +10 54	h m 20 30	° ′ +72 8
	s	″	s	″	s	″	s	″
Jan. 0.1	6.91 −.04	43.4 −2.8	46.16 +.02	61.8 0.0	44.72 .00	66.8 −1.6	26.86 −.35	59.2 −3.0
10.0	6.89 .00	40.6 2.9	46.20 .06	61.8 0.0	44.74 +.03	65.1 1.7	26.58 .28	56.1 3.2
20.0	6.91 +.05	37.7 3.0	46.27 .09	61.8 +0.1	44.78 .06	63.4 1.7	26.42 −.09	52.8 3.4
30.0	6.98 .09	34.7 2.9	46.38 .13	61.7 0.2	44.86 .10	61.8 1.6	26.40 +.04	49.3 3.4
Feb. 9.0	7.10 .14	31.9 2.7	46.52 .16	61.4 0.3	44.98 .13	60.3 1.4	26.50 .17	45.9 3.3
18.9	7.26 +.18	29.3 −2.4	46.69 +.19	61.1 +0.4	45.12 +.16	59.0 −1.2	26.74 +.30	42.7 −3.1
28.9	7.47 .22	27.0 2.0	46.89 .21	60.6 0.5	45.30 .19	57.9 0.9	27.10 .42	39.7 2.8
Mar. 10.9	7.71 .26	25.2 1.6	47.12 .24	60.0 0.7	45.50 .21	57.2 0.6	27.57 .52	37.1 2.3
20.9	7.98 .29	23.9 1.1	47.37 .26	59.2 0.8	45.73 .24	56.8 −0.2	28.14 .61	35.0 1.8
30.8	8.28 .31	23.1 −0.5	47.64 .28	58.4 0.9	45.97 .26	56.8 +0.2	28.78 .67	33.4 1.2
Apr. 9.8	8.60 +.33	22.9 +0.1	47.92 +.29	57.4 +1.0	46.24 +.27	57.2 +0.6	29.48 +.72	32.5 −0.6
19.8	8.94 .34	23.2 0.7	48.22 .30	56.3 1.1	46.52 .29	57.9 0.9	30.22 .74	32.2 0.0
29.7	9.28 .34	24.1 1.2	48.52 .31	55.1 1.2	46.81 .29	59.0 1.3	30.96 .74	32.6 +0.7
May 9.7	9.62 .34	25.6 1.7	48.84 .31	53.9 1.2	47.10 .29	60.5 1.6	31.69 .71	33.6 1.3
19.7	9.95 .32	27.4 2.1	49.14 .30	52.7 1.2	47.40 .28	62.2 1.8	32.39 .67	35.1 1.8
29.7	10.26 +.30	29.8 +2.5	49.44 +.29	51.6 +1.1	47.67 +.27	64.0 +2.0	33.03 +.60	37.2 +2.3
June 8.6	10.55 .27	32.4 2.8	49.72 .27	50.6 1.0	47.94 .25	66.1 2.1	33.59 .52	39.7 2.7
18.6	10.80 .23	35.3 3.0	49.98 .24	49.6 0.9	48.18 .22	68.2 2.2	34.06 .42	42.6 3.1
28.6	11.01 .19	38.3 3.1	50.21 .21	48.9 0.7	48.39 .19	70.4 2.1	34.44 .32	45.8 3.3
July 8.6	11.17 .14	41.5 3.2	50.40 .17	48.3 0.5	48.56 .15	72.5 2.1	34.70 .20	49.2 3.5
18.5	11.28 +.09	44.6 +3.1	50.55 +.13	47.8 +0.3	48.70 +.11	74.6 +2.0	34.84 +.08	52.8 +3.6
28.5	11.34 +.03	47.7 3.0	50.65 .08	47.6 +0.2	48.79 .07	76.5 1.8	34.86 −.04	56.3 3.6
Aug. 7.5	11.35 −.02	50.7 2.9	50.71 +.03	47.5 0.0	48.83 +.02	78.2 1.7	34.76 .16	59.9 3.5
17.4	11.30 .07	53.4 2.6	50.72 −.01	47.6 −0.2	48.84 −.02	79.8 1.4	34.54 .28	63.3 3.3
27.4	11.20 .12	55.9 2.4	50.69 .06	47.9 0.3	48.79 .06	81.1 1.2	34.21 .38	66.5 3.1
Sept. 6.4	11.06 −.16	58.1 +2.0	50.61 −.10	48.2 −0.4	48.71 −.10	82.2 +1.0	33.78 −.48	69.4 +2.8
16.4	10.88 .20	60.0 1.7	50.49 .13	48.6 0.5	48.60 .13	83.1 0.7	33.26 .56	72.1 2.4
26.3	10.66 .23	61.5 1.3	50.35 .15	49.1 0.5	48.46 .15	83.6 0.5	32.65 .63	74.3 2.0
Oct. 6.3	10.43 .24	62.5 0.8	50.19 .17	49.6 0.5	48.30 .17	84.0 +0.2	31.99 .68	76.1 1.5
16.3	10.18 .25	63.1 +0.4	50.01 .17	50.1 0.5	48.12 .17	84.0 +0.1	31.29 .72	77.4 1.0
26.2	9.92 −.25	63.2 −0.1	49.84 −.17	50.6 −0.5	47.95 −.17	83.8 −0.3	30.56 −.73	78.2 +0.5
Nov. 5.2	9.68 .24	62.8 0.6	49.67 .16	51.0 0.4	47.78 .16	83.4 0.6	29.82 .73	78.4 −0.1
15.2	9.45 .22	62.0 1.1	49.52 .14	51.4 0.4	47.63 .14	82.7 0.8	29.10 .70	78.0 0.6
25.2	9.24 .19	60.7 1.5	49.40 .11	51.7 0.3	47.50 .12	81.7 1.1	28.42 .66	77.1 1.2
Dec. 5.1	9.07 .16	59.0 1.9	49.31 .08	52.0 0.3	47.39 .09	80.5 1.3	27.78 .59	75.6 1.8
15.1	8.93 −.12	56.8 −2.3	49.25 −.04	52.2 −0.2	47.31 −.06	79.1 −1.4	27.23 −.51	73.5 −2.3
25.1	8.83 .07	54.4 2.6	49.23 .00	52.4 0.1	47.27 −.03	77.6 1.6	26.76 .41	71.0 2.7
35.1	*8.78* −.03	51.6 −2.8	49.24 +.03	52.5 −0.1	47.26 +.01	76.0 −1.7	26.41 −.29	68.1 −3.1

APPARENT PLACES FOR THE UPPER TRANSIT AT WASHINGTON.

Mean Solar Date.	61[1] Cygni. Right Ascension.	61[1] Cygni. Declination North.	ζ Cygni. Right Ascension.	ζ Cygni. Declination North.	α Cephei. Right Ascension.	α Cephei. Declination North.	1 Pegasi. Right Ascension.	1 Pegasi. Declination North.
	h m 21 1	+38° 11′	h m 21 8	+29° 45′	h m 21 15	+62° 5′	h m 21 16	+19° 18′
	s	″	s	″	s	″	s	″
Jan. 0.1	46.07 −.08	33.3 −2.3	3.94 −.07	45.5 −2.2	50.11 −.25	86.1 −2.5	47.76 −.06	70.2 −1.8
10.1	46.02 −.04	30.9 2.5	3.89 −.03	43.2 2.3	49.89 .18	83.4 2.9	47.72 −.02	68.4 1.9
20.0	46.00 +.01	28.3 2.6	3.88 .00	40.8 2.4	49.74 .11	80.3 3.1	47.72 +.01	66.5 1.9
30.0	46.03 .05	25.6 2.7	3.90 +.04	38.4 2.4	49.67 −.03	77.1 3.3	47.74 .04	64.6 1.9
Feb. 9.0	46.10 .10	23.0 2.6	3.96 .08	36.0 2.3	49.68 +.05	73.8 3.3	47.80 .08	62.7 1.8
19.0	46.22 +.14	20.5 −2.4	4.06 +.12	33.8 −2.1	49.77 +.13	70.6 −3.1	47.90 +.12	61.0 −1.6
28.9	46.38 .18	18.3 2.1	4.20 .16	31.8 1.8	49.95 .21	67.6 2.9	48.04 .15	59.5 1.3
Mar. 10.9	46.58 .22	16.4 1.7	4.38 .19	30.2 1.4	50.20 .29	64.8 2.5	48.19 .17	58.4 1.0
20.9	46.82 .26	14.9 1.2	4.59 .23	28.9 1.0	50.52 .36	62.5 2.1	48.38 .21	57.5 0.6
30.9	47.10 .29	14.0 0.7	4.83 .26	28.1 0.6	50.91 .41	60.7 1.5	48.60 .24	57.1 −0.2
Apr. 9.8	47.40 +.32	13.5 −0.2	5.10 +.28	27.8 −0.1	51.35 +.46	59.4 −1.0	48.85 +.26	57.1 +0.2
19.8	47.73 .34	13.6 +0.4	5.39 .30	28.0 +0.4	51.83 .49	58.8 −0.3	49.12 .28	57.6 0.6
29.8	48.07 .35	14.3 0.9	5.70 .31	28.7 0.9	52.33 .51	58.7 +0.3	49.41 .30	58.4 1.1
May 9.7	48.42 .35	15.5 1.4	6.02 .32	29.9 1.4	52.85 .51	59.3 0.9	49.71 .30	59.7 1.4
19.7	48.77 .35	17.2 1.9	6.34 .32	31.5 1.8	53.36 .50	60.5 1.5	50.02 .30	61.3 1.8
29.7	49.11 +.33	19.3 +2.3	6.65 +.30	33.4 +2.1	53.86 +.48	62.2 +2.0	50.32 +.30	63.2 +2.0
June 8.7	49.44 .31	21.7 2.6	6.95 .29	35.7 2.4	54.32 .44	64.4 2.4	50.61 .28	65.3 2.2
18.6	49.73 .28	24.5 2.9	7.23 .26	38.3 2.6	54.74 .39	67.1 2.8	50.88 .26	67.6 2.4
28.6	49.99 .24	27.5 3.1	7.47 .23	41.0 2.8	55.10 .33	70.1 3.1	51.13 .23	70.1 2.5
July 8.6	50.21 .20	30.6 3.2	7.68 .19	43.8 2.8	55.39 .26	73.3 3.4	51.34 .20	72.6 2.5
18.6	50.38 +.15	33.8 +3.2	7.85 +.15	46.7 +2.8	55.62 +.18	76.8 +3.5	51.52 +.16	75.0 +2.4
28.5	50.51 .10	37.0 3.2	7.98 .10	49.5 2.8	55.76 .10	80.3 3.6	51.66 .11	77.4 2.3
Aug. 7.5	50.58 +.04	40.2 3.0	8.05 +.05	52.2 2.7	55.82 +.02	83.9 3.6	51.75 .07	79.7 2.2
17.5	50.60 −.01	43.1 2.9	8.08 .00	54.8 2.5	55.80 −.06	87.4 3.5	51.79 +.02	81.8 2.0
27.4	50.56 .06	45.9 2.6	8.06 −.04	57.1 2.2	55.70 .14	90.8 3.3	51.79 −.02	83.8 1.8
Sept. 6.4	50.48 −.10	48.4 +2.4	7.99 −.09	59.2 +2.0	55.53 −.21	94.0 +3.0	51.75 −.06	85.4 +1.5
16.4	50.36 .14	50.6 2.0	7.89 .12	61.1 1.7	55.29 .27	96.9 2.7	51.66 .10	86.8 1.3
26.4	50.20 .17	52.5 1.7	7.75 .15	62.6 1.3	54.99 .33	99.5 2.4	51.55 .13	87.9 1.0
Oct. 6.3	50.02 .20	53.9 1.3	7.58 .18	63.7 1.0	54.64 .37	101.7 2.0	51.41 .15	88.8 0.7
16.3	49.81 .21	55.0 0.9	7.40 .19	64.5 0.6	54.25 .40	103.4 1.5	51.25 .16	89.3 +0.4
26.3	49.59 −.22	55.6 +0.4	7.20 −.20	64.9 +0.2	53.83 −.42	104.6 +1.0	51.08 −.17	89.4 0.0
Nov. 5.3	49.37 .22	55.8 −0.1	7.00 .20	64.9 −0.2	53.40 .43	105.3 +0.4	50.91 .17	89.3 −0.3
15.2	49.16 .21	55.5 0.5	6.80 .19	64.5 0.6	52.97 .43	105.5 −0.1	50.74 .16	88.9 0.6
25.2	48.96 .19	54.8 1.0	6.63 .17	63.7 1.0	52.54 .41	105.1 0.7	50.59 .15	88.1 0.9
Dec. 5.2	48.78 .16	53.5 1.4	6.47 .15	62.4 1.4	52.14 .38	104.1 1.3	50.45 .13	87.0 1.2
15.1	48.63 −.13	51.9 −1.8	6.33 −.12	60.9 −1.7	51.78 −.34	102.5 −1.8	50.34 −.10	85.7 −1.5
25.1	48.51 .10	49.9 2.1	6.23 .09	59.0 2.0	51.46 .29	100.4 2.3	50.25 .07	84.2 1.7
35.1	48.43 −.07	47.6 −2.4	6.16 −.06	56.9 −2.2	51.20 −.23	97.9 −2.7	50.19 −.04	82.4 −1.9

APPARENT PLACES FOR THE UPPER TRANSIT AT WASHINGTON.

Mean Solar Date.	11 Cephei. Right Ascension.	11 Cephei. Declination North.	μ Capricorni. Right Ascension.	μ Capricorni. Declination South.	79 Draconis. Right Ascension.	79 Draconis. Declination North.	α Aquarii. Right Ascension.	α Aquarii. Declination South.
	h m 21 40	° ′ +70 47	h m 21 47	° ′ −14 4	h m 21 51	° ′ +73 9	h m 21 59	° ′ − 0 52
	s	″	s	″	s	″	s	″
Jan. 0.1	13.61 −.45	29.9 −2.2	3.57 −.05	77.3 −0.3	25.37 −.55	65.5 −2.1	54.68 −.07	21.7 −0.9
10.1	13.20 .36	27.4 2.7	3.53 −.03	77.5 0.2	24.86 .45	63.1 2.5	54.63 .04	22.6 0.8
20.1	12.88 .26	24.5 3.0	3.52 .00	77.7 −0.1	24.46 .34	60.4 2.9	54.60 −.01	23.4 0.8
30.0	12.67 .15	21.4 3.2	3.54 +.03	77.7 +0.1	24.18 .22	57.3 3.2	54.60 +.01	24.1 0.7
Feb. 9.0	12.58 −.03	18.1 3.3	3.58 .06	77.5 0.2	24.02 −.09	54.0 3.3	54.63 .04	24.8 0.6
19.0	12.61 +.09	14.8 −3.3	3.66 +.09	77.2 +0.4	24.01 +.05	50.7 −3.3	54.69 +.07	25.2 −0.4
Mar. 1.0	12.76 .21	11.6 3.1	3.77 .13	76.7 0.6	24.13 .19	47.5 3.2	54.78 .10	25.5 −0.2
10.9	13.02 .32	8.6 2.8	3.91 .16	76.0 0.8	24.39 .33	44.4 2.9	54.90 .14	25.6 +0.1
20.9	13.40 .43	5.9 2.4	4.08 .19	75.1 1.0	24.78 .45	41.6 2.6	55.05 .17	25.4 0.3
30.9	13.88 .52	3.7 2.0	4.29 .22	74.0 1.2	25.29 .56	39.3 2.1	55.24 .20	24.9 0.6
Apr. 9.9	14.44 +.59	2.0 −1.4	4.52 +.24	72.8 +1.3	25.90 +.65	37.4 −1.6	55.45 +.23	24.2 +0.9
19.8	15.07 .65	0.9 0.8	4.77 .27	71.4 1.5	26.58 .72	36.2 1.0	55.69 .25	23.2 1.1
29.8	15.74 .69	0.4 −0.2	5.05 .29	69.8 1.6	27.33 .76	35.5 −0.4	55.96 .27	21.9 1.4
May 9.8	16.44 .70	0.5 +0.4	5.35 .30	68.2 1.6	28.11 .79	35.4 +0.2	56.24 .29	20.4 1.6
19.7	17.14 .69	1.2 1.0	5.65 .31	66.5 1.7	28.90 .78	35.9 0.8	56.54 .30	18.8 1.7
29.7	17.83 +.67	2.6 +1.6	5.96 +.31	64.9 +1.6	29.67 +.75	37.1 +1.4	56.84 +.30	17.0 +1.8
June 8.7	18.47 .62	4.4 2.1	6.27 .30	63.3 1.6	30.40 .71	38.8 1.9	57.14 .30	15.1 1.9
18.7	19.06 .56	6.8 2.5	6.57 .29	61.8 1.4	31.08 .64	40.9 2.4	57.43 .28	13.2 1.9
28.6	19.58 .48	9.5 2.9	6.85 .27	60.4 1.3	31.69 .55	43.6 2.8	57.70 .26	11.4 1.8
July 8.6	20.02 .39	12.6 3.2	7.10 .24	59.2 1.1	32.19 .46	46.6 3.1	57.95 .23	9.6 1.7
18.6	20.35 +.28	15.9 +3.4	7.32 +.20	58.2 +0.9	32.60 +.34	49.8 +3.4	58.17 +.20	8.0 +1.6
28.6	20.59 .18	19.4 3.6	7.50 .16	57.4 0.7	32.88 .23	53.3 3.6	58.35 .16	6.5 1.4
Aug. 7.5	20.71 +.07	23.1 3.7	7.64 .12	56.9 0.4	33.05 +.11	56.9 3.6	58.49 .12	5.2 1.2
17.5	20.72 −.04	26.8 3.6	7.73 .07	56.6 +0.2	33.09 −.02	60.6 3.7	58.58 .08	4.1 1.0
27.5	20.63 .15	30.4 3.6	7.78 +.02	56.5 0.0	33.02 .14	64.2 3.6	58.64 +.03	3.2 0.8
Sept. 6.4	20.43 −.25	33.8 +3.4	7.78 −.02	56.6 −0.2	32.82 −.25	67.8 +3.5	58.65 −.01	2.5 +0.6
16.4	20.13 .34	37.1 3.1	7.74 .06	56.9 0.4	32.51 .36	71.1 3.2	58.62 .05	2.1 0.3
26.4	19.75 .43	40.0 2.8	7.66 .09	57.4 0.5	32.10 .46	74.2 2.9	58.55 .08	1.9 +0.1
Oct. 6.4	19.28 .50	42.7 2.4	7.56 .12	58.0 0.6	31.60 .54	77.0 2.6	58.46 .11	1.8 −0.1
16.3	18.75 .56	44.9 2.0	7.43 .14	58.6 0.7	31.02 .61	79.4 2.2	58.34 .12	2.0 0.2
26.3	18.17 −.60	46.6 +1.5	7.29 −.15	59.3 −0.7	30.37 −.67	81.3 +1.7	58.21 −.14	2.3 −0.4
Nov. 5.3	17.55 .63	47.8 0.9	7.14 .15	60.0 0.7	29.68 .71	82.8 1.2	58.07 .14	2.7 0.5
15.3	16.92 .64	48.5 +0.4	6.99 .14	60.6 0.7	28.95 .73	83.6 +0.6	57.93 .14	3.2 0.6
25.2	16.28 .63	48.6 −0.2	6.85 .13	61.3 0.6	28.22 .73	83.9 0.0	57.79 .13	3.9 0.7
Dec. 5.2	15.66 .60	48.1 0.8	6.73 .12	61.8 0.5	27.50 .71	83.6 −0.6	57.67 .12	4.6 0.8
15.2	15.07 −.56	47.0 −1.4	6.62 −.09	62.3 −0.5	26.81 −.66	82.7 −1.2	57.56 −.10	5.4 −0.8
25.1	14.54 .50	45.3 1.9	6.54 .07	62.8 0.4	26.18 .60	81.2 1.8	57.47 .08	6.3 0.9
35.1	*14.07 −.42*	43.1 −2.4	6.48 −.04	63.1 −0.2	25.61 −.52	79.2 −2.3	57.40 −.05	7.1 −0.9

APPARENT PLACES FOR THE UPPER TRANSIT AT WASHINGTON.

Mean Solar Date.	226 Cephei (B.) Right Ascension.	226 Cephei (B.) Declination North.	ζ Pegasi. Right Ascension.	ζ Pegasi. Declination North.	ι Cephei. Right Ascension.	ι Cephei. Declination North.	λ Aquarii. Right Ascension.	λ Aquarii. Declination South.
	22h 30m	+75° 38′	22h 35m	+10° 14′	22h 45m	+65° 36′	22h 46m	− 8° [illegible]′
Jan. 0.2	15.59s −.73	39.4″ −1.6	45.86s −.09	15.6″ −1.2	37.00s −.40	81.0″ −1.5	39.15s −.09	71.3″ [illegible]
10.1	14.90 .64	37.5 2.1	45.77 .07	14.4 1.2	36.61 .36	79.3 2.0	39.06 .07	71.9 [illegible]
20.1	14.31 .50	35.2 2.5	45.71 .05	13.2 1.2	36.28 .30	77.0 2.4	39.00 .05	72.3 [illegible]
30.1	13.84 .40	32.5 2.9	45.67 −.03	12.0 1.2	36.00 .25	74.4 2.8	38.96 −.03	72.6 [illegible]
Feb. 9.1	13.51 .25	29.4 3.1	45.66 .00	10.8 1.1	35.81 .15	71.5 3.0	38.95 .00	72.7 [illegible]
19.0	13.33 −.10	26.2 −3.3	45.68 +.03	9.7 −1.0	35.70 −.07	68.4 −3.1	38.96 +.03	72.7 [illegible]
Mar. 1.0	13.32 +.07	22.9 3.3	45.72 .07	8.8 0.8	35.68 +.03	65.2 3.1	39.01 .06	72.4 [illegible]
11.0	13.47 .23	19.7 3.1	45.81 .10	8.1 0.8	35.76 .13	62.2 3.0	39.08 .09	72.0 [illegible]
20.9	13.78 .36	16.7 2.8	45.92 .14	7.7 −0.3	35.93 .22	59.3 2.7	39.19 .13	71.3 [illegible]
30.9	14.24 .53	14.1 2.5	46.06 .17	7.6 0.8	36.19 .31	56.7 2.4	39.34 .16	70.4 [illegible]
Apr. 9.9	14.84 +.65	11.8 −2.0	46.27 +.20	7.8 +0.4	36.55 +.39	54.6 −1.9	39.52 +.20	69.3 [illegible]
19.9	15.55 .76	10.0 1.5	46.49 .23	8.3 0.7	36.97 .46	52.9 1.4	39.73 .23	67.9 [illegible]
29.8	16.35 .83	8.8 0.9	46.74 .26	9.2 1.0	37.46 .52	51.8 0.8	39.97 .25	66.4 [illegible]
May 9.8	17.22 .89	8.2 −0.3	47.01 .28	10.4 1.3	38.00 .56	51.2 −0.3	40.24 .28	64.7 [illegible]
19.8	18.12 .91	8.2 +0.3	47.30 .30	11.9 1.6	38.57 .58	51.2 +0.3	40.52 .30	62.9 [illegible]
29.8	19.04 +.90	8.8 +0.9	47.60 +.30	13.6 +1.8	39.16 +.58	51.9 +0.9	40.83 +.30	61.0 [illegible]
June 8.7	19.93 .87	10.0 1.4	47.91 .30	15.5 2.0	39.74 .57	53.0 1.5	41.13 .31	59.1 [illegible]
18.7	20.78 .81	11.7 2.0	48.21 .29	17.6 2.1	40.30 .55	54.8 2.0	41.44 .30	57.3 [illegible]
28.7	21.56 .74	13.9 2.4	48.50 .28	19.7 2.2	40.83 .50	57.0 2.4	41.74 .29	55.5 [illegible]
July 8.6	22.25 .64	16.5 2.8	48.76 .25	21.9 2.2	41.31 .45	59.6 2.8	42.01 .27	53.9 [illegible]
18.6	22.83 +.52	19.5 +3.2	49.00 +.22	24.0 +2.1	41.73 +.38	62.5 +3.1	42.27 +.24	52.4 +1.4
28.6	23.30 .40	22.8 3.4	49.21 .19	26.0 2.0	42.08 .31	65.8 3.3	42.49 .20	51.2 1.1
Aug. 7.6	23.63 .27	26.3 3.6	49.38 .15	28.0 1.8	42.35 .23	69.2 3.5	42.67 .16	50.1 [illegible]
17.5	23.83 +.13	30.0 3.7	49.50 .11	29.7 1.7	42.54 .14	72.8 3.6	42.82 .12	49.4 [illegible]
27.5	23.89 −.01	33.7 3.7	49.59 .06	31.3 1.5	42.64 +.06	76.4 3.6	42.92 .08	48.8 [illegible]
Sept. 6.5	23.82 −.14	37.3 +3.6	49.63 +.02	32.6 +1.2	42.66 −.02	80.0 +3.5	42.98 +.04	48.6 [illegible]
16.5	23.61 .27	40.9 3.5	49.63 −.02	33.8 1.0	42.59 .10	83.4 3.4	43.00 .00	48.5 [illegible]
26.4	23.27 .40	44.3 3.3	49.60 .05	34.7 0.8	42.45 .18	86.8 3.2	42.97 −.04	48.7 [illegible]
Oct. 6.4	22.81 .56	47.5 3.0	49.53 .08	35.3 0.5	42.24 .25	89.8 2.9	42.92 .07	49.0 [illegible]
16.4	22.26 .61	50.4 2.7	49.44 .10	35.7 0.3	41.95 .31	92.6 2.6	42.84 .09	49.5 [illegible]
26.3	21.60 −.69	52.8 +2.2	49.33 −.12	35.9 +0.1	41.62 −.38	94.9 +2.1	42.73 −.11	50.1 [illegible]
Nov. 5.3	20.87 .76	54.8 1.7	49.20 .13	35.8 −0.2	41.23 .40	96.9 1.7	42.61 .12	50.8 [illegible]
15.3	20.08 .81	56.3 1.2	49.06 .13	35.5 0.4	40.81 .43	98.3 1.2	42.48 .13	51.5 [illegible]
25.3	19.25 .84	57.2 +0.6	48.93 .13	35.0 0.6	40.36 .45	99.2 +0.6	42.36 .13	52.3 [illegible]
Dec 5.2	18.40 .84	57.5 0.0	48.80 .13	34.4 0.8	39.90 .46	99.5 0.0	42.23 .12	53.0 [illegible]
15.2	17.57 −.82	57.2 −0.6	48.68 −.12	33.5 −0.9	39.44 −.45	99.2 −0.6	42.11 −.11	53.7 [illegible]
25.2	16.77 .77	56.3 1.2	48.56 .10	32.5 1.1	39.00 .43	98.3 1.2	42.00 .10	54.3 [illegible]
35.2	16.02 −.71	54.8 −1.8	48.47 −.08	31.4 −1.2	38.58 −.38	96.9 −1.7	41.91 −.08	54.9 [illegible]

APPARENT RIGHT ASCENSIONS AND APPROXIMATE NORTH POLAR DISTANCES, FOR THE UPPER TRANSIT AT WASHINGTON.

Mean Solar Date.	β Cassiop.	22 Androm.	σ Androm.	ι Ceti.	6 Urs. Min., S. P.	44 Piscium.	π Androm.	ο Cassiop.
	31° 28′	44° 33′	53° 50′	99° 28′	358° 20′	88° 41′	56° 54′	42° 20′
	h m 0 3	h m 0 4	h m 0 12	h m 0 13	h m 0 13	h m 0 19	h m 0 30	h m 0 38
	s	s	s	s	s	s	s	s
…c. 30.3	6.43 − .34	24.10 − .22	22.55 − .17	36.61 − .11	61.79 +7.70	33.28 − .13	47.80 − .18	23.04 − .24
…. 9.2	6.10 .32	23.88 .20	22.38 .16	36.50 .11	69.40 7.50	33.15 .12	47.62 .17	22.80 .24
19.2	5.79 .30	23.69 .19	22.22 .16	36.39 .11	76.80 7.15	33.05 .10	47.46 .16	22.55 .23
29.2	5.50 − .28	23.50 − .18	22.06 − .16	36.29 − .10	83.69 +6.55	32.95 − .09	47.30 − .15	22.33 − .22
…g. 26.6	10.64 + .22	27.67 + .18	25.85 + .18	39.66 + .17	24.35 −3.14	36.24 + .16	50.88 + .18	26.35 + .25
…t. 5.5	10.83 .16	27.83 .13	26.01 .14	39.81 .13	21.71 2.14	36.39 .14	51.05 .16	26.57 .19
15.5	10.96 .10	27.94 .09	26.13 .10	39.92 .09	20.06 1.12	36.51 .10	51.19 .12	26.73 .14
25.5	11.02 + .04	28.01 + .04	26.20 .05	39.99 .06	19.47 −0.04	36.58 .06	51.28 .07	26.84 .09
…. 5.5	11.03 − .02	28.02 − .01	26.22 + .01	40.03 + .02	19.97 +1.05	36.62 + .03	51.33 + .04	26.91 + .04
15.4	10.97 − .08	27.99 − .04	26.22 − .02	40.02 − .02	21.57 +2.15	36.63 .00	51.35 .00	26.93 .00
25.4	10.87 .14	27.93 .08	26.18 .06	39.99 .04	24.26 3.24	36.61 − .04	51.33 − .03	26.91 − .04
…v. 4.4	10.71 .19	27.83 .12	26.11 .09	39.94 .07	28.05 4.30	36.56 .06	51.29 .06	26.85 .08
14.4	10.50 .23	27.69 .16	26.01 .12	39.86 .09	32.85 5.26	36.49 .08	51.21 .10	26.75 .12
24.3	10.24 .26	27.52 .18	25.88 .14	39.77 .10	38.57 6.11	36.41 .09	51.10 .12	26.61 .16
…c. 4.3	9.98 − .26	27.34 − .20	25.74 − .15	39.66 − .11	45.07 +6.80	36.31 − .10	50.98 − .13	26.44 − .18
14.3	9.67 .28	27.13 .21	25.58 .17	39.55 .12	52.16 7.30	36.20 .11	50.84 .14	26.25 .20
24.3	9.34 .30	26.92 .22	25.40 .18	39.42 .13	59.68 7.60	36.09 .12	50.69 .16	26.04 .21
34.2	9.02 − .32	26.70 − .22	25.23 − .17	39.30 − .12	67.38 +7.70	35.97 − .12	50.52 − .17	25.82 − .22

Mean Solar Date.	δ Piscium.	γ Cassiop.	μ Androm.	43 Cephei.	κ Tucanæ.	f Piscium.	κ Octantis, S. P.	υ Androm.
	83° 2′	29° 54′	52° 7′	4° 21′	159° 29′	86° 59′	184° 48′	49° 10′
	h m 0 42	h m 0 49	h m 0 50	h m 0 53	h m 1 11	h m 1 11	h m 1 22	h m 1 30
	s	s	s	s	s	s	s	s
…c. 30.3	46.01 − .12	51.06 − .33	26.05 − .18	28.83 −2.84	53.03 − .55	55.19 − .13	43.33 +2.86	7.28 − .17
…. 9.2	45.89 .12	50.72 .35	25.87 .19	26.00 2.82	52.48 .55	55.06 .13	46.17 2.83	7.10 .19
19.2	45.76 .12	50.36 .35	25.68 .19	23.18 2.79	51.93 .53	54.93 .13	48.99 2.77	6.90 .22
29.2	45.64 − .12	50.03 − .33	25.49 − .19	20.42 −2.73	51.42 − .49	54.80 − .13	51.71 +2.66	6.66 − .25
…pt. 5.6	48.96 + .14	55.07 + .24	29.23 + .19	44.60 +1.40	56.71 + .38	57.86 + .18	38.97 −1.61	10.16 + .26
15.5	49.09 .12	55.29 .20	29.40 .15	45.89 1.00	57.05 .30	58.02 .14	37.58 1.17	10.39 .20
25.5	49.19 .08	55.46 .13	29.52 .10	46.77 .67	57.31 .21	58.14 .11	36.63 .73	10.55 .15
…t. 5.5	49.25 .05	55.55 .07	29.60 .06	47.23 + .25	57.47 .12	58.24 .08	36.13 − .25	10.69 .12
15.5	49.29 + .02	55.60 + .02	29.64 + .02	47.27 − .18	57.55 + .04	58.30 .05	36.12 + .24	10.78 .08
25.4	49.29 − .01	55.58 − .05	29.65 − .01	46.86 − .63	57.54 − .06	58.33 + .02	36.62 + .74	10.84 + .05
…v. 4.4	49.26 .03	55.50 .11	29.62 .05	46.02 1.06	57.43 .16	58.33 − .01	37.60 1.23	10.87 + .01
14.4	49.22 .06	55.36 .17	29.56 .08	44.74 1.47	57.22 .25	58.30 .03	39.09 1.66	10.85 − .04
24.4	49.15 .08	55.16 .22	29.46 .11	43.09 1.85	56.93 .34	58.26 .05	40.96 2.07	10.79 .07
…c. 4.3	49.06 .09	54.92 .26	29.34 .13	41.05 2.21	56.55 .42	58.19 .08	43.23 2.40	10.70 .10
14.3	48.96 − .10	54.65 − .30	29.20 − .15	38.68 −2.50	56.10 − .49	58.11 − .10	45.76 +2.63	10.59 − .13
24.3	48.85 .11	54.33 .33	29.04 .16	36.06 2.69	55.57 .55	58.00 .11	48.48 2.77	10.44 .16
34.2	48.73 − .12	53.99 − .35	28.87 − .17	33.30 −2.80	55.01 − .57	57.89 − .12	51.30 +2.85	10.27 − .18

APPARENT RIGHT ASCENSIONS AND APPROXIMATE NORTH POLAR DISTANCES FOR THE UPPER TRANSIT AT WASHINGTON.

Mean Solar Date.	π Piscium.	ν Piscium.	ζ Ceti.	γ Andromedæ.	β Trianguli.	δ Urs. Min., S. P.	γ Trianguli.	ξ (
	78° 26′	85° 5′	100° 54′	48° 13′	55° 28′	246° 5′	56° 41′	9
	h m 1 31	h m 1 25	h m 1 45	h m 1 56	h m 2 2	h m 2 9	h m 2 10	2
	s	s	s	s	s	s	s	s
(Dec. 30.2)	2.61 − .13	30.18 − .12	50.15 − .13	55.17 − .16	46.53 − .14	13.11 +1.06	33.13 − .12	18.13
Jan. 9.2	2.48 .13	30.06 .12	50.02 .13	55.00 .18	46.38 .16	14.17 1.08	32.99 .16	18.02
19.2	2.35 .14	29.93 .14	49.89 .14	54.81 .20	46.21 .18	15.26 1.12	32.82 .18	17.89
29.2	2.21 .14	29.79 .13	49.74 .15	54.59 .23	46.03 .18	16.43 1.16	32.63 .18	17.74
Feb. 8.2	2.08 .14	29.66 .12	49.59 .14	54.35 .23	45.83 .19	17.54 1.10	32.45 .19	17.59
18.2	2.94 − .14	29.54 − .11	49.45 − .13	54.16 − .19	45.64 − .19	18.62 +1.08	32.26 − .19	17.44
Sept. 25.6	6.48 + .14	32.99 + .12	52.79 + .14	58.29 + .20	49.47 + .17	10.72 − .32	35.99 + .18	20.60
Oct. 5.5	6.60 .10	33.10 .10	52.92 .12	58.47 .15	49.63 .15	10.34 .41	36.16 .16	20.75
15.5	6.69 .08	33.19 .07	53.02 .09	58.59 .11	49.75 .12	9.90 .25	36.30 .12	20.87
25.5	6.73 + .06	33.24 + .04	53.09 + .05	58.69 + .08	49.86 + .09	9.74 − .03	36.41 + .09	20.96
Nov. 4.5	6.75 + .01	33.27 + .01	53.12 + .02	58.75 + .04	49.93 .05	9.74 + .10	36.48 .05	21.03
14.5	6.75 − .02	33.27 − .03	53.12 − .01	58.77 .03	49.96 + .01	9.94 .30	36.53 + .02	21.04
24.4	6.71 .04	33.24 .05	53.10 .04	58.75 − .04	49.94 − .03	10.34 .48	36.52 − .02	21.04
Dec. 4.4	6.66 .06	33.18 .07	53.05 .06	58.69 .08	49.90 .06	10.90 .64	36.49 .05	21.01
14.3	6.58 − .08	33.11 − .08	52.98 − .08	58.60 − .11	49.82 − .08	11.63 + .80	36.43 − .08	20.95
24.3	6.48 .11	33.02 .10	52.88 .11	58.47 .15	49.73 .11	12.50 .94	36.33 .12	20.87
34.3	6.37 − .12	32.91 − .12	52.76 − .13	58.30 − .19	49.59 − .15	13.51 +1.07	36.20 − .14	20.77

Mean Solar Date.	δ Hydri.	δ Ceti.	μ Hydri.	θ Persei.	σ Arietis.	47 Cephei.	ε Arietis.	β Pe (Alg
	159° 11′	90° 9′	169° 36′	41° 15′	75° 23′	11° 2′	69° 7′	49
	h m 2 19	h m 2 33	h m 2 34	h m 2 36	h m 2 45	h m 2 50	h m 2 52	3
	s	s	s	s	s	s	s	s
(Dec. 30.4)	43.61 − .53	38.89 − .10	7.24 −1.14	26.40 − .15	12.65 − .08	64.01 − .74	42.46 − .08	46.40
Jan. 9.3	43.07 .55	38.78 .12	6.08 1.19	26.22 .21	12.55 .12	63.20 .88	42.36 .12	46.28
19.3	42.50 .57	38.66 .14	4.86 1.22	25.98 .24	12.42 .13	62.26 .99	42.23 .15	46.10
29.3	41.92 .58	38.51 .15	3.63 1.23	25.74 .25	12.28 .15	61.23 1.05	42.07 .16	45.89
Feb. 8.2	41.35 .57	38.36 .15	2.41 1.21	25.48 .26	12.12 .16	60.17 1.07	41.91 .17	45.67
18.2	40.79 − .56	38.20 − .16	1.22 −1.17	25.22 − .26	11.96 − .16	59.09 −1.09	41.74 − .18	45.45
Sept. 25.6	45.86 + .36	41.20 + .18	8.89 + .73	29.39 + .28	15.00 + .21	69.62 + .88	44.82 + .22	49.01
Oct. 5.6	46.17 .26	41.37 .16	9.52 .53	29.65 .23	15.19 .17	70.44 .74	45.02 .18	49.25
15.5	46.39 .16	41.51 .13	9.95 .32	29.86 .18	15.34 .14	71.13 .61	45.19 .16	49.46
Nov. 25.5	46.50 + .06	41.62 + .10	10.15 + .10	30.02 + .14	15.47 + .11	71.66 + .46	45.34 + .13	49.63
4.5	46.50 − .06	41.70 .07	10.14 − .13	30 15 .10	15.57 .09	72.05 .28	45.45 .10	49.78
14.5	46.39 .17	41.76 .04	9.89 .35	30.22 .05	15.65 .06	72.21 + .09	45 53 .06	49.88
24.4	46.17 .26	41.78 + .01	9.43 .56	30.26 + .01	15.69 + .02	72.23 − .08	45.58 + .03	49.95
Dec. 4.4	45.87 35	41.77 − .02	8.78 .74	30.23 − .05	15.69 − .01	72.04 .29	45.60 .00	49.97
14.4	45.48 − .42	41.73 − .05	7.95 − .91	30.17 − .10	15.67 − .04	71.66 − .48	45.58 − .03	49.95
24.4	45.03 .49	41.67 .07	6.96 1.04	30.04 .14	15.62 .07	71.07 .66	45.53 .06	49.89
34.3	44.51 − .55	41.59 − .09	5.88 −1.11	29.89 − .17	15.53 − .11	70.35 − .78	45.45 − .10	49.76

APPARENT RIGHT ASCENSIONS AND APPROXIMATE NORTH POLAR DISTANCES, FOR THE UPPER TRANSIT AT WASHINGTON.

Mean Solar Date.	ρ Octantis, S. P	ι Hydri.	f Tauri.	γ Camelop.	γ Hydri.	ε Persei.	A¹ Tauri.	o Persei.
	185° 55′	167° 48′	77° 27′	19° 1′	164° 35′	50° 19′	68° 14′	42° 35′
	h m 3 17	h m 3 18	h m 3 24	h m 3 38	h m 3 48	h m 3 50	h m 3 57	h m 4 0
	s	s	s	s	s	s	s	s
ec. 30.4)	3.81 +2.14	51.35 – .86	35.57 – .06	23.94 – .29	63.43 – .59	13.66 – .07	58.46 – .04	24.91 – .08
n. 9.3	6.01 2.26	50.45 .95	35.48 .10	23.60 .38	62.79 .69	13.57 .11	58.40 .08	24.82 .12
19.3	8.33 2.38	49.45 1.03	35.37 .13	23.16 .49	62.05 .78	13.44 .15	58.30 .12	24.66 .18
29.3	10.77 2.44	48.39 1.07	35.22 .15	22.63 .55	61.24 .84	13.26 .19	58.16 .15	24.46 .22
b. 8.3	13.21 2.44	47.31 1.08	35.06 .16	22.06 .59	60.37 .88	13.05 .21	58.00 .17	24.22 .24
18.2	15.66 +2.40	46.23 –1.07	34.89 – .17	21.46 – .61	59.48 – .89	12.83 – .23	57.83 – .18	23.97 – .26
28.2	18.01 +2.29	45.16 –1.07	34.72 – .17	20.85 – .62	58.59 – .89	12.59 – .24	57.64 – .19	23.70 – .27
t. 5.6	10.24 –1.14	51.39 + .64	37.83 + .21	27.77 + .60	62.60 + .50	16.10 + .26	60.57 + .26	27.42 + .30
15.6	9.27 .80	51.94 .46	38.02 .17	28.33 .52	63.13 .48	16.37 .26	60.81 .22	27.72 .29
25.5	8.65 – .41	52.32 + .29	38.18 + .15	28.81 + .44	63.55 + .35	16.61 + .23	61.02 + .19	28.01 + .27
v. 4.5	8.46 + .03	52.50 + .09	38.32 .13	29.20 .35	63.84 .21	16.82 .19	61.19 .16	28.26 .23
14.5	8.71 .46	52.51 – .10	38.44 .10	29.50 .23	63.97 + .08	16.98 .15	61.35 .14	28.46 .16
24.5	9.38 .67	52.31 .28	38.52 .06	29.67 .12	63 96 – .08	17.11 .11	61.47 .10	28.61 .13
c. 4.4	10.44 1.26	51.95 .46	38.56 + .02	29.74 + .01	63.80 .23	17.20 .07	61.55 .07	28.71 .08
14.4	11.90 +1.69	51.39 – .63	38.57 – .01	29.70 – .10	63.50 – .38	17.24 + .01	61.60 + .03	28.77 + .02
24.4	13.67 1.89	50.69 .78	38.55 .04	29.52 .23	63.03 .52	17.22 – .04	61.61 – .01	28.75 – .04
34.4	15.70 +2.16	49.84 – .93	38.49 – .08	29.24 – .35	62.46 – .62	17.17 – .07	61.58 – .05	28.70 – .08

Mean Solar Date.	o¹ Eridani.	η Urs. Min., S. P.	m Persei.	δ Mensæ.	τ Tauri.	ι Tauri.	ζ Aurigæ.	β Eridani.
	97° 8′	346° 1′	47° 11′	170° 29′	67° 16′	71° 21′	49° 5′	95° 14′
	h m 4 6	h m 4 20	h m 4 25	h m 4 25	h m 4 35	h m 4 44	h m 4 54	h m 5 2
	s	s	s	s	s	s	s	s
ec. 30.4)	18.93 – .06	45.07 + .48	25.29 – .04	48.17 – .86	25.36 – .01	43.47 .00	32.16 + .01	15.80 .03
n. 9.4	18.87 .08	45.62 .69	25.23 .08	47.21 1.06	25.33 .05	43.45 – .04	32.14 – .05	15.78 – .04
19.4	18.77 .10	46 31 .76	25.12 .13	46.05 1.22	25.26 .10	43.39 .08	32.06 .11	15.72 .08
29.3	18.66 .13	47.13 .85	24.96 .18	44.77 1.34	25.14 .13	43.29 .12	31.93 .16	15.63 .11
b. 8.3	18.50 .16	48.01 .92	24.75 .22	43.38 1.42	25.00 .16	43.15 .15	31.75 .20	15.50 .15
18.3	18.34 – .18	48.96 + .96	24.52 – .24	41.94 –1.46	24.83 – .19	42.99 – .17	31.53 – .22	15.34 – .17
28.2	18.15 .19	49.93 .97	24.28 .25	40.47 1.46	24.63 .20	42.81 .19	31.30 .23	15.16 .18
ar. 10.2	17.97 – .18	50.87 + .96	24.03 – .26	39.02 –1.43	24.44 – .19	42.61 – .21	31.06 – .24	14.97 – .19
t. 15.6	20.85 + .20	44.70 – .74	27.81 + .30	44.39 + .80	27.48 + .27	45.47 + .24	34.42 + .28	17.34 + .22
25.6	21.04 + .17	44.03 – .60	28.10 + .28	45.19 + .70	27.73 + .23	45.71 + .23	34.73 + .30	17.56 + .22
v. 4.6	21.20 .15	43.51 .45	28.37 .25	45.79 .46	27.95 .20	45.94 .21	35.02 .28	17.78 .20
14.5	21.34 .13	43.13 .30	28.59 .20	46.16 + .24	28.13 .17	46.13 .17	35.28 .24	17.95 .18
24.5	21.46 .10	42.91 – .14	28.76 .16	46.27 – .09	28.29 .14	46.29 .14	35.49 .19	18.13 .16
c. 4.5	21.53 .05	42.86 + .04	28.90 .11	46.13 .27	28.42 .10	46.42 .11	35.65 .15	18.26 .12
14.4	21.56 + .01	42.99 + .21	28.98 + .06	45.74 – .51	28.50 + .06	46.52 + .07	35.78 + .10	18.35 + .08
24.4	21.56 – .03	43.28 .39	29.01 + .01	45.12 .74	28.54 + .02	46.57 + .03	35.85 + .05	18.41 + .04
34.4	21.52 – .06	43.76 + .56	28.99 – .04	44.27 – .97	28.54 – .02	46.58 – [illegible]	35.87 .00	18.42 – .01

APPARENT RIGHT ASCENSIONS AND APPROXIMATE NORTH POLAR DISTANCES, FOR THE UPPER TRANSIT AT WASHINGTON.

Mean Solar Date.	τ Orionis.	χ Aurigæ.	Groombr. 944.	κ Orionis.	ν Aurigæ.	δ Doradus.	β Aurigæ.	θ Aur
	96° 58′	57° 54′	4° 52′	99° 43′	50° 53′	155° 47′	45° 4′	52°
	h m 5 12	h m 5 25	h m 5 25	h m 5 42	h m 5 43	h m 5 44	h m 5 51	h 5
	s	s	s	s	s	s	s	s
(Dec. 30.4)	5.37 + .01	19.94 + .04	49.23 − .27	22.14 + .04	36.82 + .07	37.46 − .15	11.67 + .03	58.37
Jan. 9.4	5.36 − .03	19.96 − .01	48.72 .75	22.16 − .01	36.86 .00	37.27 .23	11.72 + .01	58.42
19.4	5.31 .07	19.93 .06	47.73 1.20	22.12 .05	36.83 − .05	37.00 .31	11.69 − .05	58.40
29.4	5.22 .12	19.84 .11	46.96 1.60	22.05 .10	36.75 .11	36.64 .40	11.61 .11	58.33
Feb. 8.3	5.08 .15	19.71 .15	44.42 2.00	21.93 .14	36.62 .15	36.21 .47	11.47 .17	58.21
18.3	4.93 − .17	19.54 − .18	42.26 − 2.27	21.78 − .16	36.45 − .19	35.70 − .52	11.27 − .21	58.05
28.3	4.75 .18	19.35 .21	39.88 2.44	21.61 .17	36.23 .22	35.17 .55	11.05 .24	57.84
Mar. 10.3	4.56 .19	19.12 .23	37.38 2.50	21.43 .18	36.00 .23	34.60 .57	10.79 .26	57.62
20.2	4.37 − .19	18.90 − .25	34.87 − 2.51	21.24 − .19	35.77 − .24	34.03 − .57	10.53 − .27	57.40
Oct. 25.6	7.06 + .23	22.18 + .28	57.21 + 2.36	23.61 + .25	39.03 + .34	36.28 + .46	13.94 + .37	60.50
Nov. 4.6	7.28 .21	22.46 .27	59.52 2.21	23.85 .23	39.36 .31	36.72 .40	14.30 .34	60.82
14.6	7.48 .19	22.71 .24	61.63 1.91	24.07 .21	39.66 .28	37.09 .32	14.63 .31	61.12
24.5	7.65 .16	22.94 .20	63.35 1.50	24.28 .18	39.92 .24	37.37 .23	14.92 .27	61.38
Dec. 4.5	7.79 .12	23.12 .16	64.62 1.04	24.43 .14	40.15 .20	37.55 .14	15.18 .23	61.62
14.5	7.88 + .08	23.27 + .12	65.44 + .56	24.56 + .10	40.32 + .15	37.64 + .04	15.38 + .17	61.80
24.5	7.94 + .04	23.36 .07	65.74 + .07	24.64 .06	40.45 .10	37.63 − .06	15.52 .12	61.94
34.4	7.96 .00	23.42 + .03	65.58 − .38	24.68 + .02	40.53 + .05	37.51 − .17	15.61 + .06	62.03

Mean Solar Date.	η Geminor.	ψ^1 Aurigæ.	ν Geminor.	χ Draconis, S. P.	ϵ Geminor.	ψ^6 Aurigæ.	θ Geminor.	ζ Mon
	67° 28′	40° 39′	69° 43′	342° 41′	64° 45′	46° 19′	55° 54′	170°
	h m 6 7	h m 6 16	h m 6 22	h m 6 23	h m 6 36	h m 6 38	h m 6 45	h 6
	s	s	s	s	s	s	s	s
(Dec. 30.5)	61.07 + .09	8.89 + .13	12.88 + .09	2.36 + .02	56.33 + .12	32.81 + .15	17.87 + .13	40.60 −
Jan. 9.5	61.13 + .03	8.98 + .04	12.95 + .05	2.45 .16	56.42 .07	32.92 + .07	17.96 .08	40.33
19.4	61.14 − .03	8.98 − .03	12.97 − .01	2.68 .30	56.46 + .01	32.95 .00	18.04 + .02	39.82
29.4	61.08 .08	8.92 .10	12.93 .06	3.06 .44	56.44 − .04	32.93 − .06	18.02 − .04	39.06
Feb. 8.4	60.99 .11	8.79 .16	12.86 .11	3.56 .54	56.37 .09	32.84 .12	17.96 .09	38.11
18.3	60.87 − .14	8.61 − .21	12.74 − .14	4.17 + .62	56.26 − .13	32.70 − .17	17.85 − .14	36.95
28.3	60.71 .17	8.37 .25	12.59 .17	4.80 .70	56.12 .16	32.51 .21	17.69 .18	35.66
Mar. 10.3	60.53 .20	8.10 .28	12.41 .18	5.54 .74	55.94 .19	32.28 .24	17.49 .21	34.26
20.3	60.32 .20	7.81 .29	12.22 .19	6.28 .77	55.74 .20	32.04 .26	17.28 .22	32.77
30.2	60.13 .19	7.52 .28	12.03 .19	7.07 .78	55.54 .20	31.77 .25	17.05 .23	31.26
Apr. 9.2	59.94 − .18	7.24 − .27	11.85 − .18	7.83 + .73	55.35 − .19	31.54 − .21	16.82 − .23	29.74
Nov. 14.6	63.45 + .27	11.83 + .37	15.14 + .28	2.73 − .56	58.62 + .29	35.46 + .36	20.29 + .32	34.0
24.6	63.70 .24	12.18 .33	15.40 .24	2.22 .46	58.90 .26	35.80 .32	20.60 .30	34.9
Dec. 4.6	63.92 .20	12.48 .27	15.63 .20	1.81 .35	59.15 .23	36.10 .28	20.88 .26	35.5
14.5	64.09 + .15	12.73 + .22	15.81 + .17	1.53 − .21	59.37 + .20	36.36 + .24	21.12 + .21	36.0
24.5	64.22 .11	12.92 .16	15.97 .13	1.39 − .07	59.53 .16	36.57 .18	21.30 .16	36.1
34.5	64.31 + .07	13.05 + .10	16.07 + .09	1.40 + .07	59.66 + .11	36.72 + .12	21.45 + .11	36.0

APPARENT RIGHT ASCENSIONS AND APPROXIMATE NORTH POLAR DISTANCES, FOR THE UPPER TRANSIT AT WASHINGTON.

Mean Solar Date.	ζ Geminor. 69° 16′ 6h 57m	63 Aurigæ. 50° 30′ 7h 3m	25 Camelop. 7° 22′ 7h 7m	γ² Volantis. 160° 19′ 7h 9m	β Canis Minoris. 81° 29′ 7h 20m	26 Lyncis. 42° 9′ 7h 46m	Groombr. 1374. 15° 47′ 7h 46m	ω¹ Cancri. 64° 18′ 7h 54m
	s	s	s	s	s	s	s	s
c. 30.5)	22.06 + .14	50.20 + .17	11.15 + .05	47.42 + .06	59.25 + .14	25.92 + .23	35.18 + .50	3.09 + .18
n. 9.5	22.17 .09	50.34 .11	11.62 + .29	47.41 − .06	59.37 .10	26.12 .17	35.59 .31	3.25 .13
19.5	22.23 + .03	50.42 + .04	11.72 − .08	47.27 .19	59.45 + .05	26.26 .10	35.80 + .14	3.36 .09
29.4	22.23 − .02	50.42 − .02	11.50 .40	47.02 .31	59.47 .00	26.33 + .03	35.87 − .01	3.43 + .04
b. 8.4	22.19 .07	50.37 .06	10.93 .73	46.65 .41	59.44 − .05	26.32 − .04	35.77 .19	3.44 − .03
18.4	22.10 − .11	50.27 − .13	10.05 −1.02	46.19 − .51	59.37 − .09	26.25 − .10	35.49 − .34	3.39 − .07
28.4	21.96 .15	50.11 .18	8.90 1.25	45.63 .59	59.26 .13	26.11 .17	35.09 .47	3.31 .11
r. 10.4	21.81 .17	49.90 .21	7.55 1.43	45.01 .64	59.12 .15	25.91 .20	34.55 .59	3.18 .15
20.3	21.62 .19	49.68 .23	6.05 1.54	44.35 .67	58.96 .17	25.68 .25	33.92 .66	3.00 .18
30.3	21.43 .19	49.44 .24	4.48 1.59	43.66 .69	58.78 .18	25.42 .27	33.23 .71	2.82 .18
r. 9.2	21.24 − .18	49.21 − .22	2.87 −1.58	42.97 − .68	58.60 − .17	25.15 − .26	32.51 − .73	2.64 − .18
19.2	21.06 − .17	49.01 − .18	1.32 −1.50	42.30 − .67	58.43 − .16	24.89 − .25	31.79 − .72	2.46 − .18
v. 24.6	24.48 + .28	52.97 + .33	18.56 +1.62	45.92 + .48	61.37 + .26	28.64 + .40	39.06 + .89	5.36 + .32
c. 4.6	24.74 .24	53.28 .29	20.07 1.40	46.35 .37	61.62 .24	29.04 .37	39.90 .80	5.67 .29
14.6	24.96 + .20	53.56 + .25	21.37 +1.14	46.67 + .26	61.85 + .21	29.39 + .33	40.65 + .70	5.95 + .26
24.5	25.14 .16	53.79 .20	22.35 .83	46.86 .13	62.05 .18	29.70 .28	41.29 .57	6.20 .26
34.5	25.28 + .12	53.95 + .13	23.03 + .55	46.93 + .01	62.20 + .13	29.95 + .23	41.78 + .43	6.40 + .17

Mean Solar Date.	ζ¹ Cancri. 72° 1′ 8h 5m	β Cancri. 80° 28′ 8h 10m	30 Monocerotis. 93° 32′ 8h 19m	θ Chamæleontis. 167° 7′ 8h 24m	σ Hydræ. 86° 16′ 8h 32m	γ Cancri. 68° 7′ 8h 36m	σ² Cancri. 59° 0′ 8h 47m	θ Hydræ. 87° 13′ 9h 8m
	s	s	s	s	s	s	s	s
ec. 30.6)	41.45 + .17	20.98 + .18	58.92 + .18	9.64 + .30	49.00 + .19	42.23 + .22	18.17 + .26	26.89 + .25
n. 9.6	41.61 .14	21.14 .14	59.08 .14	9.88 + .16	49.17 .15	42.43 .18	18.40 .20	27.11 .19
19.5	41.71 .10	21.27 .10	59.20 .10	9.97 − .01	49.32 .12	42.59 .13	18.58 .15	27.27 .14
29.5	41.82 + .05	21.34 + .05	59.27 + .05	9.86 .20	49.41 .07	42.70 .09	18.70 .10	27.39 .10
b. 8.5	41.84 − .01	21.36 .00	59.29 .00	9.58 .37	49.45 + .02	42.75 + .03	18.77 + .05	27.47 + .05
18.4	41.81 − .06	21.33 − .05	59.27 − .05	9.12 − .54	49.44 − .03	42.75 − .00	18.79 − .01	27.50 .00
28.4	41.73 .10	21.26 .09	59.20 .09	8.50 .66	49.38 .06	42.70 .07	18.74 .07	27.47 − .05
ar. 10.4	41.61 .13	21.15 .13	59.09 .12	7.76 .79	49.29 .11	42.61 .11	18.65 .12	27.41 .08
20.4	41.46 .16	21.01 .15	58.96 .14	6.92 .88	49.17 .14	42.47 .14	18.51 .15	27.31 .11
30.3	41.29 .17	20.85 .16	58.80 .16	6.00 .95	49.02 .15	42.32 .16	18.35 .16	27.19 .13
pr. 9.3	41.12 − .18	20.69 − .17	58.63 − .17	5.02 − .99	48.86 − .16	42.15 − .17	18.18 − .18	27.05 − .14
19.3	40.94 .17	20.52 .17	58.46 .17	4.01 1.02	48.70 .16	41.98 .17	17.99 .19	26.90 .15
29.3	40.78 .16	20.35 .15	58.30 .16	2.99 1.01	48.54 .16	41.81 .17	17.81 .18	26.75 .15
ay 9.2	40.63 − .14	20.21 − .13	58.15 − .15	1.99 − .98	48.39 − .15	41.65 − .16	17.64 − .17	26.60 − .15

APPARENT RIGHT ASCENSIONS AND APPROXIMATE NORTH POLAR DISTANCES, FOR THE UPPER TRANSIT AT WASHINGTON.

Mean Solar Date.	β Argus.	α Lyncis.	10 Leonis Minoris.	ο Leonis.	ζ Chamæleontis.	19 Leonis Minoris.	π Leonis.	λ Ursæ Majoris.
	159° 15′	55° 8′	53° 6′	79° 35′	170° 26′	48° 24′	81° 25′	46° 31′
	h m 9 11	h m 9 14	h m 9 27	h m 9 35	h m 9 37	h m 9 50	h m 9 54	h m 10 10
	s	s	s	s	s	s	s	s
(Dec. 30.6)	60.91 + .41	7.21 + .30	14.96 + .30	4.67 + .26	21.56 + .87	42.54 + .34	11.98 + .27	13.49 + .37
Jan. 9.6	61.26 .28	7.48 .24	15.24 .26	4.91 .22	22.31 .63	42.86 .30	12.23 .23	13.84 .33
19.6	61.47 .16	7.70 .19	15.49 .21	5.10 .18	22.83 .40	43.14 .25	12.45 .19	14.15 .28
29.5	61.59 + .05	7.86 .13	15.66 .15	5.26 .13	23.11 + .17	43.36 .18	12.61 .14	14.39 .21
Feb. 8.5	61.57 − .07	7.96 .07	15.78 .09	5.37 .06	23.17 − .06	43.50 .12	12.74 .10	14 57 .15
18.5	61.45 − .18	8.00 + .02	15.84 + .03	5.42 + .03	22.98 − .29	43.59 + .06	12.81 + .05	14.68 + .09
28.5	61.21 .29	7.99 − .04	15.84 − .02	5.43 − .02	22.59 .50	43.62 .00	12.84 .00	14.74 + .03
Mar. 10.4	60.87 .37	7.92 .10	15.79 .08	5.39 .06	21.98 .70	43.59 − .06	12.82 − .04	14.73 − .04
20.4	60.47 .44	7.80 .14	15.67 .13	5.31 .09	21.19 .86	43.50 .11	12.76 .07	14.66 .10
30.4	59.99 .50	7.65 .16	15.53 .16	5.21 .11	20.25 1.01	43.37 .15	12.67 .10	14.54 .14
Apr. 9.3	59.46 − .54	7.48 − .18	15.36 − .18	5.08 − .13	19.18 −1.13	43.21 − .18	12.56 − .12	14.39 − .16
19.3	58.91 .57	7.29 .19	15.18 .19	4.94 .14	18.00 1.21	43.02 .19	12.42 .13	14.21 .19
29.3	58.33 .58	7.10 .19	14.98 .19	4.79 .15	16.76 1.26	42.82 .20	12.29 .14	14.01 .21
May 9.3	57.75 .58	6.91 .18	14.80 .18	4.65 .14	15.48 1.29	42.62 .20	12.15 .14	13.79 .21
19.2	57.17 − .58	6.74 − .16	14.62 − .17	4.51 − .14	14.18 −1.30	42.42 − .20	12.01 − .14	13.60 − .18

Mean Solar Date.	μ Hydræ.	β Leonis Minoris.	α Antliæ.	β Octantis, S. P.	41 Leonis Minoris.	δ² Chamæleontis.	46 Leonis Minoris.	Groombr. 1706.
	106° 15′	52° 43′	120° 29′	188° 1′	66° 13′	169° 56′	55° 10′	11° 37′
	h m 10 20	h m 10 21	h m 10 21	h m 10 34	h m 10 37	h m 10 44	h m 10 46	h m 10 50
	s	s	s	s	s	s	s	s
Jan. 19.6	35.97 + .20	18.31 + .26	57.72 + .20	9.16 − .69	13.88 + .24	50.83 + .77	56.88 + .28	50.29 + .93
29.6	36.15 .16	18.55 .21	57.90 .16	8.59 .45	14.10 .20	51.50 .57	57.14 .23	51.14 .77
Feb. 8.6	36.30 .12	18.72 .15	58.04 .12	8.27 − .20	14.27 .15	51.97 .36	57.33 .17	51.82 .57
18.5	36.39 .07	18.84 .10	58.13 .07	8.19 + .03	14.40 .10	52.21 + .14	57.48 .13	52.28 .36
28.5	36.43 + .02	18.91 + .04	58.17 + .01	8.34 .26	14.48 + .05	52.26 − .06	57.58 .07	52.53 + .15
Mar. 10.5	36.43 − .02	18.91 − .02	58.15 − .04	8.72 + .50	14.50 − .01	52.09 − .25	57.61 + .01	52.57 − .06
20.4	36.39 .06	18.87 .06	58.10 .07	9.34 .72	14.48 .05	51.75 .44	57.60 − .04	52.40 .26
30.4	36.31 .09	18.78 .11	58.01 .10	10.17 .93	14.42 .08	51.21 .61	57.54 .08	52.04 .45
Apr. 9.4	36.21 .11	18.65 .14	57.89 .13	11.21 1.12	14.33 .10	50.53 .75	57.44 .11	51.49 .63
19.4	36.09 .12	18.50 .16	57.75 .15	12.42 1.29	14.22 .12	49.70 .88	57.32 .13	50.82 .73
29.3	35.96 − .13	18.33 − .17	57.59 − .16	13.79 +1.43	14.09 − .14	48.77 − .99	57.17 − .15	50.03 − .83
May 9.3	35.82 .14	18.16 .18	57.43 .16	15.29 1.55	13.94 .15	47.72 1.06	57.02 .16	49.16 .89
19.3	35.68 .14	17.98 .17	57.27 .17	16.87 1.62	13.80 .14	46.64 1.11	56.85 .17	48.24 .92
29.3	35.54 .13	17.81 .16	57.10 .15	18.52 1.65	13.66 .13	45.50 1.15	56.68 .15	47.31 .91
June 8.2	35.41 − .12	17.65 − .15	56.96 − .13	20.18 +1.66	13.54 − .11	44.33 −1.18	56.54 − .13	46.41 − .89

APPARENT RIGHT ASCENSIONS AND APPROXIMATE NORTH POLAR DISTANCES, FOR THE UPPER TRANSIT AT WASHINGTON.

Mean Solar Date.	η Octantis.	p^3 Leonis.	ψ Urs. Maj.	ν Urs. Maj.	ξ Hydræ.	χ Urs. Maj.	π Virginis.	ε Corvi.
	173° 59′	87° 26′	44° 53′	56° 17′	121° 13′	41° 35′	82° 45′	111° 59′
	h m 11 0	h m 11 1	h m 11 3	h m 11 12	h m 11 27	h m 11 40	h m 11 55	h m 12 4
	s	s	s	s	s	s	s	s
Feb. 8.6	20.84 + .66	6.63 + .14	16.35 + .20	20.48 + .21	25.51 + .18	2.79 + .28	2.95 + .20	17.29 + .19
18.6	21.36 .35	6.76 .12	16.53 .15	20.66 .15	25.67 .14	3.04 .21	3.13 .16	17.47 .17
28.5	21.55 + .03	6.87 .08	16.66 .10	20.78 .10	25.79 .10	3.21 .14	3.28 .12	17.63 .14
Mar. 10.5	21.42 − .30	6.91 + .03	16.72 + .06	20.85 + .04	25.86 .05	3.32 .08	3.38 .06	17.74 .09
20.5	20.95 .61	6.92 − .01	16.72 − .03	20.86 − .01	25.88 + .01	3.37 + .02	3.44 .05	17.81 .05
30.4	20.21 − .89	6.88 − .04	16.66 − .08	20.83 − .05	25.87 − .03	3.36 − .03	3.47 + .02	17.84 + .01
Apr. 9.4	19.17 1.17	6.83 .07	16.56 .12	20.76 .08	25.82 .06	3.30 .08	3.47 − .02	17.84 − .01
19.4	17.88 1.40	6.74 .09	16.43 .15	20.66 .12	25.74 .09	3.19 .13	3.43 .06	17.81 .04
29.4	16.37 1.60	6.64 .10	16.26 .18	20.53 .13	25.64 .11	3.04 .16	3.36 .08	17.76 .07
May 9.3	14.69 1.74	6.53 .11	16.07 .20	20.39 .15	25.52 .13	2.86 .19	3.28 .09	17.68 .09
19.3	12.88 −1.87	6.41 − .12	15.87 − .20	20.23 − .15	25.38 − .14	2.66 − .20	3.19 − .09	17.58 − .10
29.3	10.95 1.95	6.29 .12	15.66 .20	20.08 .15	25.24 .15	2.45 .22	3.09 .10	17.48 .11
June 8.3	8.98 1.97	6.17 .12	15.47 .19	19.92 .15	25.08 .15	2.22 .20	2.98 .11	17.36 .12
18.2	7.02 −1.95	6.06 − .11	15.28 − .18	19.77 − .14	24.93 − .14	2.01 − .21	2.87 − .10	17.24 − .12

Mean Solar Date.	2 Can. Ven.	6 Urs. Min.	δ^2 Corvi.	β Can. Ven.	γ Virginis, (mean.)	31 Cor. Bor.	γ Cassiop., S. P.	43 Cephei, S. P.
	48° 42′	1° 40′	105° 53′	48° 1′	90° 49′	61° 50′	330° 6′	355° 39′
	h m 12 10	h m 12 14	h m 12 23	h m 12 28	h m 12 35	h m 12 46	h m 12 49	h m 12 53
	s	s	s	s	s	s	s	s
Feb. 8.6	25.62 + .29	30.04 + 6.35	59.35 + .24	20.46 + .30	54.18 + .10	9.54 + .26	49.72 − .33	17.78 − 2.40
18.6	25.88 .22	35.13 4.61	59.56 .18	20.73 .24	54.30 .13	9.80 .24	49.43 .24	15.56 2.02
28.6	26.07 .16	39.02 3.38	59.72 .14	20.95 .18	54.46 .15	10.01 .19	49.23 .18	13.74 1.60
Mar. 10.5	26.21 .11	41.64 2.04	59.85 .11	21.10 .13	54.60 .12	10.17 .14	49.07 .13	12.37 1.12
20.5	26.30 .08	42.83 + .62	59.95 .07	21.21 .08	54.70 .08	10.29 .10	48.98 − .06	11.50 .60
30.5	26.33 + .01	42.61 − .76	60.00 + .03	21.27 + .04	54.77 + .05	10.36 + .06	48.96 + .03	11.18 − .04
Apr. 9.5	26.33 − .03	41.04 2.10	60.02 .00	21.28 − .01	54.80 + .01	10.40 + .02	49.05 .13	11.43 + .49
19.4	26.27 .07	38.18 3.33	60.01 − .02	21.24 .06	54.80 − .02	10.39 − .02	49.22 .20	12.16 1.00
29.4	26.18 .11	34.17 4.41	59.98 .04	21.17 .09	54.77 .04	10.36 .05	49.45 .28	13.42 1.49
May 9.4	26.05 .14	29.18 5.32	59.92 .07	21.06 .12	54.73 .06	10.29 .07	49.78 .35	15.13 1.90
19.3	25.90 − .15	23.38 − 6.04	59.84 − .08	20.93 − .14	54.66 − .07	10.21 − .09	50.16 + .40	17.22 + 2.25
29.3	25.75 .16	17.01 6.56	59.75 .09	20.77 .16	54.59 .08	10.11 .11	50.59 .45	19.64 2.53
June 8.3	25.57 .18	10.21 6.88	59.65 .10	20.60 .18	54.50 .10	9.99 .12	51.07 .50	22.28 2.73
18.3	25.39 − .19	3.24 − 6.95	59.54 − .11	20.41 − .20	54.39 − .12	9.86 − .14	51.60 + .55	25.09 + 2.87

APPARENT RIGHT ASCENSIONS AND APPROXIMATE NORTH POLAR DISTANCES, FOR THE UPPER TRANSIT AT WASHINGTON.

Mean Solar Date.	δ Muscæ.	ε Virginis.	20 Can. Ven.	κ Octantis.	B.A.C. 4536.	m Virginis.	θ Apodis.	π Hydr
	160° 56′	78° 26′	48° 50′	175° 12′	52° 14′	98° 8′	166° 15′	116° 9
	h m 12 54	h m 12 56	h m 13 12	h m 13 22	h m 13 29	h m 13 35	h m 13 54	h 13 5
	s	s	s	s	s	s	s	s
Feb. 28.6	31.70 + .43	31.40 + .16	26.91 + .26	58.59 +1.80	43.36 + .25	39.05 + .21	21.26 + .79	54.44 +
Mar. 10.6	32.08 .32	31.55 .14	27.12 .20	60.23 1.49	43.59 .20	39.24 .17	21.99 .68	54.66
20.6	32.35 .23	31.68 .11	27.29 .14	61.52 1.10	43.75 .15	39.39 .14	22.61 .54	54.87
30.5	32.53 .12	31.76 .07	27.39 .08	62.43 .71	43.89 .11	39.52 .11	23.08 .41	55.02
Apr. 9.5	32.60 + .03	31.81 + .04	27.46 + .04	62.94 + .32	43.98 .06	39.62 .08	23.43 .29	55.15
19.5	32.58 − .06	31.83 .00	27.47 .00	63.08 − .06	44.01 + .02	39.68 + .04	23.66 + .15	55.25 +
29.5	32.48 .15	31.81 − .03	27.46 − .04	62.82 .45	44.02 − .02	39.71 + .02	23.74 + .02	55.32
May 9.4	32.28 .23	31.78 .05	27.39 .08	62.19 .83	43.98 .05	39.72 − .01	23.70 − .11	55.35 +
19.4	32.01 .30	31.72 .07	27.30 .10	61.17 1.18	43.92 .08	39.70 .03	23.52 .23	55.36 −
29.4	31.67 .37	31.65 .08	27.18 .14	59.84 1.47	43.82 .12	39.66 .05	23.23 .35	55.34
June 8.3	31.26 − .43	31.56 − .10	27.03 − .16	58.22 −1.77	43.69 − .14	39.60 − .07	22.82 − .47	55.30 −
18.3	30.80 .49	31.46 .11	26.87 .17	56.30 2.00	43.55 .15	39.53 .09	22.29 .57	55.22
28.3	30.27 .51	31.34 .12	26.69 .18	54.21 2.19	43.40 .17	39.43 .11	21.68 .65	55.13
July 8.3	29.78 − .47	31.22 − .12	26.50 − .19	51.92 −2.30	43.22 − .19	39.32 − .12	21.00 − .72	55.00 −

Mean Solar Date.	d Bootis.	κ Virginis.	δ Octantis.	4 Urs. Min.	λ Bootis.	λ Virginis.	α Apodis.	μ Hyd S. P
	64° 22′	99° 45′	173° 9′	11° 55′	43° 23′	102° 51′	168° 34′	190°
	h m 14 5	h m 14 6	h m 14 8	h m 14 9	h m 14 12	h m 14 12	h m 14 33	h 14
	s	s	s	s	s	s	s	s
Mar. 20.6	13.35 + .18	50.50 + .17	59.60 +1.15	21.17 + .59	4.33 + .21	58.13 + .19	52.73 + .85	58.20 −
30.6	13.51 .14	50.66 .14	60.65 .92	21.67 .42	4.52 .16	58.30 .15	53.50 .70	57.46
Apr. 9.5	13.62 .10	50.79 .11	61.45 .65	22.00 .23	4.66 .11	58.43 .12	54.12 .54	56.89
19.5	13.70 .06	50.88 .08	61.96 .38	22.13 + .05	4.75 .07	58.54 .09	54.58 .38	56.50
29.5	13.75 .04	50.95 .05	62.22 + .12	22.09 − .14	4.80 + .02	58.61 .06	54.89 .22	56.31 −
May 9.4	13.78 + .01	50.98 + .03	62.20 − .16	21.84 − .32	4.79 − .03	58.66 + .03	55.02 + .06	56.31 +
19.4	13.76 − .03	51.00 + .01	61.90 .42	21.45 .47	4.74 .07	58.67 .00	55.01 − .10	56.52
29.4	13.71 .06	50.99 − .02	61.35 .68	20.90 .61	4.65 .11	58.67 − .02	54.82 .26	56.90
June 8.4	13.64 .08	50.95 .05	60.53 .93	20.23 .72	4.52 .14	58.63 .04	54.48 .42	57.48
18.3	13.55 .10	50.89 .07	59.49 1.14	19.45 .82	4.37 .17	58.58 .06	53.98 .55	58.22
28.3	13.45 − .12	50.81 − .09	58.24 −1.32	18.58 − .90	4.18 − .20	58.50 − .09	53.37 − .68	59.12 +
July 8.3	13.31 .14	50.71 .11	56.84 1.48	17.65 .95	3.97 .22	58.40 .11	52.62 .80	60.13
18.3	13.17 .15	50.59 .12	55.28 1.60	16.68 .98	3.74 .23	58.28 .12	51.78 .89	61.25
28.2	13.01 − .17	50.46 − .14	53.61 −1.68	15.69 −1.00	3.51 − .23	58.15 − .13	50.85 − .97	62.42 +

APPARENT RIGHT ASCENSIONS AND APPROXIMATE NORTH POLAR DISTANCES, FOR THE UPPER TRANSIT AT WASHINGTON.

Mean Solar Date.	33 Bootis.	47 Cephei, S. P.	γ Scorpii.	δ Bootis.	ρ Octantis.	β Cor. Bor.	γ Camelop., S. P.	δ¹ Apodis.
	45° 6′	348° 58′	114° 50′	56° 15′	174° 5′	60° 30′	340° 59′	168° 24′
	h m 14 34	h m 14 50	h m 14 57	h m 15 10	h m 15 17	h m 15 23	h m 15 38	h m 16 3
	s	s	s	s	s	s	s	s
ar. 30.6	37.15 + .20	55.71 − .54	25.85 + .19	55.78 + .19	24.17 +1.60	9.04 + .20	19.29 − .45	27.21 +1.06
r. 9.6	37.32 .14	55.27 .34	26.03 .17	55.96 .16	25.72 1.41	9.23 .18	18.92 .30	28.25 .94
19.5	37.43 .09	55.04 − .13	26.19 .15	56.11 .13	26.99 1.13	9.39 .15	18.70 .16	29.12 .80
29.5	37.50 .05	55.02 + .00	26.33 .12	56.23 .10	27.97 .89	9.53 .12	18.58 − .05	29.86 .66
ay 9.5	37.54 + .01	55.22 .30	26.42 .08	56.31 .07	28.62 .49	9.62 .08	18.60 + .08	30.44 .51
19.5	37.52 − .04	55.66 + .53	26.49 + .06	56.36 + .03	28.95 + .16	9.69 + .04	18.75 + .21	30.87 + .34
29.4	37.45 .08	56.27 .71	26.53 + .02	56.36 − .01	28.93 − .16	9.71 .00	19.02 .33	31.12 + .17
ne 8.4	37.35 .11	57.07 .86	26.53 − .01	56.33 .05	28.59 .51	9.69 − .03	19.41 .46	31.21 .00
18.4	37.23 .14	57.99 1.00	26.50 .04	56.26 .08	27.91 .83	9.65 .06	19.94 .55	31.12 − .18
28.4	37.06 .18	59.06 1.12	26.44 .07	56.17 .11	26.93 1.13	9.57 .09	20.51 .62	30.84 .36
ly 8.3	36.88 − .20	60.23 +1.20	26.35 − .10	56.04 − .14	25.65 −1.40	9.47 − .12	21.18 + .70	30.40 − .51
18.3	36.65 .22	61.46 1.25	26.24 .12	55.98 .16	24.14 1.63	9.33 .15	21.91 .74	29.83 .65
28.3	36.43 .23	62.72 1.27	26.11 .14	55.72 .18	22.40 1.80	9.17 .17	22.67 .77	29.10 .78
g. 7.3	36.18 .24	64.00 1.26	25.95 .16	55.52 .20	20.54 1.91	9.00 .18	23.46 .79	28.27 .88
17.2	35.94 .24	65.24 1.23	25.79 .17	55.31 .21	18.59 1.94	8.80 .20	24.25 .78	27.33 .95
27.2	35.70 − .23	66.46 +1.20	25.61 − .19	55.10 − .21	16.65 −1.92	8.60 − .21	25.03 + .77	26.37 − .98

Mean Solar Date.	φ Herculis.	σ Cor. Bor. (mean.)	γ Apodis.	ε Urs. Min.	η Ophiuchi.	π Herculis.	θ Ophiuchi.	δ Aræ.
	44° 46′	55° 51′	168° 38′	18° 59′	105° 35′	53° 4′	114° 53′	150° 35′
	h m 16 5	h m 16 10	h m 16 16	h m 16 20	h m 17 3	h m 17 11	h m 17 15	h m 17 20
	s	s	s	s	s	s	s	s
pr. 9.6	11.94 + .24	25.87 + .23	6.96 +1.01	53.30 + .63	51.79 + .28	5.77 + .26	1.93 + .31	51.12 + .51
19.6	12.16 .20	26.08 .19	7.90 .67	53.87 .51	52.05 .25	6.04 .26	2.22 .27	51.61 .48
29.6	12.34 .16	26.25 .16	8.71 .74	54.32 .38	52.28 .22	6.29 .22	2.47 .24	52.07 .44
ay 9.6	12.48 .12	26.39 .13	9.35 .57	54.62 .22	52.49 .20	6.49 .18	2.69 .21	52.48 .39
19.5	12.59 .08	26.51 .08	9.85 .43	54.76 + .06	52.68 .17	6.66 .15	2.90 .19	52.84 .33
29.5	12.63 + .03	26.57 + .04	10.18 + .24	54.75 − .09	52.82 + .13	6.79 + .11	3.07 + .16	53.14 + .26
ne 8.5	12.64 − .02	26.59 + .01	10.32 + .05	54.58 .24	52.94 .10	6.87 .07	3.21 .13	53.36 .19
18.4	12.59 .07	26.59 − .03	10.28 − .13	54.27 .38	53.03 .07	6.93 + .03	3.32 .09	53.51 .12
28.4	12.50 .12	26.53 .07	10.05 .31	53.80 .52	53.08 + .03	6.93 − .02	3.38 .05	53.60 + .05
ly 8.4	12.36 .16	26.45 .10	9.66 .47	53.23 .63	53.08 − .01	6.89 .06	3.41 + .01	53.60 − .03
18.4	12.19 − .19	26.32 − .14	9.10 − .63	52.54 − .73	53.06 − .04	6.80 − .11	3.39 − .04	53.53 − .11
28.3	11.98 .22	26.16 .17	8.40 .76	51.77 .81	52.99 .08	6.67 .15	3.33 .08	53.38 .18
g. 7.3	11.74 .24	25.98 .20	7.58 .88	50.91 .88	52.89 .12	6.50 .19	3.23 .12	53.16 .25
17.3	11.49 .27	25.76 .22	6.63 .96	50.01 .92	52.76 .15	6.29 .21	3.09 .15	52.88 .31
27.3	11.20 .28	25.54 .23	5.65 1.00	49.07 .94	52.60 .17	6.07 .23	2.93 .17	52.56 .35
pt. 6.2	10.93 − .27	25.31 − .23	4.64 −1.00	48.12 − .94	52.43 − .18	5.82 − .25	2.75 − .19	52.18 − .37
16.2	10.66 .26	25.08 .23	3.65 .96	47.18 .91	52.24 .19	5.57 .25	2.55 .20	51.80 .38
26.2	10.40 .24	24.86 .23	2.71 .88	46.31 .84	52.05 .17	5.32 .24	2.36 .19	51.41 .37
t. 6.2	10.17 − .20	24.61 − .24	1.88 − .76	45.50 − .76	51.89 − .14	5.08 − .23	2.18 − .17	51.05 − .34

APPARENT RIGHT ASCENSIONS AND APPROXIMATE NORTH POLAR DISTANCES, FOR THE UPPER TRANSIT AT WASHINGTON.

Mean Solar Date.	γ Sagittæ.	e Sagittarii.	θ Aquilæ.	31 Cygni.	α Delphini.	β Pavonis.	ψ Capricor.	ε Cygni.
	70° 49′	118° 2′	91° 10′	43° 36′	74° 29′	156° 37′	115° 41′	56° 27′
	h m 19 53	h m 19 55	h m 20 5	h m 20 10	h m 20 34	h m 20 34	h m 20 39	h m 20 41
	s	s	s	s	s	s	s	s
une 18.6	43.53 + .18	41.23 + .25	27.55 + .19	5.17 + .20	22.73 + .20	44.17 + .52	22.78 + .27	38.25 + .25
28.6	43.70 .16	41.46 .20	27.73 .17	5.36 .18	22.94 .19	44.65 .44	23.03 .24	38.48 .21
uly 8.5	43.85 .13	41.63 .16	27.90 .15	5.53 .14	23.12 .16	45.05 .36	23.25 .20	38.67 .17
18.5	43.95 .08	41.78 .12	28.02 .10	5.63 .07	23.26 .12	45.38 .27	23.42 .15	38.81 .12
28.5	44.00 + .03	41.86 .06	28.10 .06	5.66 + .01	23.35 .07	45.60 .15	23.55 .10	38.90 .07
ug. 7.5	44.01 − .01	41.90 + .01	28.13 + .01	5.65 − .04	23.40 + .03	45.71 + .06	23.63 + .05	38.94 + .02
17.4	43.98 .06	41.88 − .04	28.12 − .03	5.58 .10	23.41 − .02	45.72 − .04	23.66 .00	38.94 − .02
27.4	43.90 .10	41.82 .08	28.07 .07	5.45 .16	23.37 .06	45.63 .15	23.64 − .04	38.89 .07
ept. 6.4	43.78 .13	41.72 .12	27.98 .12	5.27 .21	23.29 .10	45.43 .24	23.58 .08	38.79 .12
16.4	43.64 .16	41.58 .16	27.86 .14	5.04 .24	23.18 .13	45.15 .32	23.48 .12	38.65 .16
26.3	43.46 − .18	41.41 − .18	27.71 − .15	4.79 − .28	23.03 − .15	44.80 − .39	23.34 − .15	38.47 − .18
ct. 6.3	43.27 .19	41.23 .19	27.56 .16	4.51 .28	22.88 .17	44.37 .44	23.18 .17	38.29 .20
16.3	43.08 .20	41.03 .20	27.39 .17	4.23 .29	22.70 .18	43.92 .46	23.00 .18	38.06 .22
26.3	42.88 .19	40.84 .19	27.22 .17	3.94 .29	22.52 .17	43.45 .47	22.82 .18	37.85 .21
o. 5.2	42.70 .17	40.66 .17	27.05 .15	3.65 .28	22.35 .16	42.98 .46	22.64 .17	37.64 .20
15.2	42.55 − .14	40.51 − .14	26.91 − .13	3.39 − .28	22.20 − .15	42.53 − .43	22.48 − .16	37.44 − .19
25.2	42.43 − .11	40.38 − .11	26.80 − .10	3.14 − .25	22.05 − .14	42.13 − .38	22.33 − .14	37.25 − .18

Mean Solar Date.	τ Cygni.	ζ Capricor.	74 Cygni.	λ¹ Octantis.	ζ Chamæleontis, S.P.	π² Cygni.	16 Pegasi.	π Pegasi.
	52° 26′	112° 54′	50° 6′	173° 15′	189° 34′	41° 13′	64° 37′	57° 23′
	h m 21 10	h m 21 20	h m 21 32	h m 21 33	h m 21 37	h m 21 42	h m 21 47	h m 22 4
	s	s	s	s	s	s	s	s
uly 8.6	17.24 + .19	11.83 + .23	25.60 + .21	27.99 +1.37	8.54 − .84	37.99 + .26	55.00 + .24	58.07 + .26
18.6	17.41 .14	12.04 .18	25.79 .17	29.23 1.12	7.80 .66	38.22 .20	55.21 .18	58.30 .20
28.5	17.53 .10	12.20 .14	25.94 .13	30.22 .84	7.22 .46	38.38 .14	55.36 .14	58.47 .15
ug. 7.5	17.61 + .06	12.32 .10	26.05 .08	30.90 .50	6.88 .24	38.50 .09	55.48 .11	58.61 .11
17.5	17.64 .00	12.39 + .05	26.09 + .02	31.22 + .16	6.73 − .03	38.56 + .03	55.57 .06	58.70 .07
27.5	17.61 − .05	12.41 .00	26.09 − .03	31.23 − .16	6.81 + .21	38.55 − .03	55.60 + .01	58.75 + .02
ept. 6.4	17.53 .10	12.39 − .04	26.03 .08	30.90 .50	7.15 .44	38.50 .08	55.58 − .04	58.74 − .02
16.4	17.41 .14	12.33 .08	25.93 .12	30.22 .83	7.69 .64	38.39 .14	55.52 .08	58.70 .06
26.4	17.25 .17	12.22 .12	25.79 .16	29.24 1.11	8.43 .85	38.22 .20	55.43 .11	58.61 .11
ct. 6.4	17.07 .20	12.09 .14	25.62 .19	28.00 1.36	9.39 1.05	38.00 .23	55.30 .14	58.49 .14
16.3	16.85 − .22	11.94 − .16	25.42 − .21	26.53 −1.54	10.52 +1.20	37.77 − .24	55.16 − .16	58.34 − .16
26.3	16.63 .20	11.77 .17	25.19 .23	24.93 1.66	11.78 1.29	37.52 .26	54.99 .17	58.17 .18
ov. 5.3	16.41 .21	11.60 .16	24.97 .22	23.22 1.71	13.10 1.34	37.25 .27	54.82 .17	57.99 .19
15.3	16.20 .20	11.45 .15	24.75 .21	21.50 1.70	14.47 1.36	36.97 .27	54.65 .16	57.80 .19
25.2	16.00 .19	11.30 .14	24.55 .20	19.81 1.63	15.83 1.33	36.71 .26	54.49 .15	57.61 .18
ec. 5.2	15.81 − .18	11.17 − .12	24.34 − .20	18.24 −1.50	17.12 +1.26	36.45 − .25	54.34 − .14	57.44 − .16

APPARENT RIGHT ASCENSIONS AND APPROXIMATE NORTH POLAR DISTANCES, FOR THE UPPER TRANSIT AT WASHINGTON.

Mean Solar Date.	ν Octantis.	γ Aquarii.	σ Aquarii.	α Lacertæ.	10 Lacertæ.	β Octantis.	λ Pegasi.	Groom. 1706,…
	176° 33′	91° 58′	101° 16′	40° 18′	51° 33′	171° 59′	67° 2′	348°
	h m 22 9	h m 22 15	h m 22 24	h m 22 26	h m 22 34	h m 22 34	h m 22 41	h 22
	s	s	s	s	s	s	s	s
July 8.6	43.66 +2.98	48.23 + .26	38.83 + .26	38.72 + .31	11.40 + .28	24.95 +1.37	4.71 + .27	44.03
18.6	46.39 2.50	48.46 .20	39.07 .22	39.01 .26	11.66 .24	26.26 1.24	4.96 .24	43.42
28.6	48.66 1.99	48.64 .16	39.28 .18	39.25 .20	11.88 .20	27.42 1.04	5.18 .19	42.97
Aug. 7.6	50.37 1.42	48.79 .14	39.44 .14	39.42 .14	12.05 .15	28.33 .80	5.34 .15	42.63
17.5	51.50 .81	48.92 .10	39.57 .10	39.54 .09	12.18 .10	29.01 .54	5.47 .11	42.43
27.5	51.99 + .16	48.99 + .05	39.65 + .06	39.60 + .04	12.26 + .05	29.40 + .25	5.56 + .07	42.37
Sept. 6.5	51.82 − .51	49.01 + .01	39.69 + .02	39.61 − .02	12.28 .00	29.52 − .03	5.61 + .03	42.46
16.5	50.97 1.15	49.00 − .03	39.69 − .02	39.56 .07	12.26 − .04	29.34 .33	5.61 − .02	42.74
26.4	49.53 1.74	48.95 .07	39.65 .06	39.46 .11	12.20 .08	28.86 .60	5.57 .06	43.15
Oct. 6.4	47.48 2.30	48.87 .09	39.57 .09	39.33 .16	12.10 .12	28.15 .83	5.50 .09	43.7
16.4	44.93 −2.75	48.77 − .11	39.48 − .11	39.14 − .20	11.96 − .14	27.19 −1.04	5.40 − .11	44.4
26.3	41.98 3.10	48.65 .13	39.35 .13	38.92 .23	11.81 .16	26.04 1.23	5.28 .13	45.3
Nov. 5.3	38.72 3.34	48.51 .14	39.22 .14	38.68 .25	11.63 .18	24.74 1.35	5.14 .14	46.
15.3	35.31 3.42	48.37 .13	39.08 .14	38.42 .26	11.43 .19	23.34 1.42	5.00 .14	47.3
25.3	31.87 3.40	48.25 .13	38.95 .13	38.17 .26	11.24 .20	21.89 1.43	4.85 .15	48.5
Dec. 5.2	28.50 −3.30	48.12 − .12	38.82 − .12	37.91 − .25	11.04 − .20	20.47 −1.39	4.70 − .14	49.7
15.2	25.38 −3.14	48.01 − .10	38.70 − .11	37.66 − .25	10.84 − .20	19.10 −1.34	4.56 − .13	51.0

Mean Solar Date.	o Androm.	φ Aquarii.	τ Pegasi.	λ Androm.	ι¹ Aquarii.	δ Sculptoris.	γ¹ Octantis.	33 P…
	48° 17′	96° 40′	66° 53′	44° 10′	108° 55′	118° 46′	172° 39′	
	h m 22 56	h m 23 8	h m 23 15	h m 23 32	h m 23 38	h m 23 43	h m 23 45	
	s	s	s	s	s	s	s	s
July 28.6	43.75 + .22	27.49 + .21	2.36 + .22	2.40 + .28	19.48 + .26	1.34 + .27	26.03 +1.45	32.
Aug. 7.6	43.95 .18	27.68 .18	2.56 .18	2.66 .24	19.72 .22	1.59 .23	27.38 1.25	32.
17.6	44.11 .14	27.84 .14	2.72 .14	2.87 .18	19.91 .18	1.81 .19	28.52 1.02	32.
27.5	44.22 .08	27.96 .10	2.84 .10	3.02 .13	20.07 .14	1.97 .14	29.41 .75	32.
Sept. 6.5	44.28 + .03	28.04 .06	2.92 .06	3.13 .09	20.18 .10	2.10 .10	30.02 .45	32.
16.5	44.28 − .01	28.08 + .02	2.96 + .02	3.19 + .04	20.26 + .06	2.18 + .06	30.32 + .15	32.
26.5	44.25 .05	28.08 − .01	2.97 − .02	3.20 − .02	20.29 + .01	2.21 + .02	30.33 − .16	33.
Oct. 6.4	44.17 .09	28.06 .04	2.93 .05	3.16 .06	20.28 − .02	2.22 − .02	30.00 .48	33.
16.4	44.07 .13	28.00 .08	2.87 .08	3.08 .10	20.24 .06	2.17 .06	29.38 .76	33.
26.4	43.91 .16	27.91 .10	2.77 .11	2.97 .13	20.17 .08	2.09 .10	28.48 1.02	32.
Nov. 5.4	43.74 − .18	27.80 − .11	2.66 − .12	2.82 − .16	20.07 − .10	1.98 − .12	27.34 −1.24	32.
15.3	43.55 .20	27.68 .12	2.53 .13	2.65 .19	19.96 .12	1.86 .13	26.00 1.41	32.
25.3	43.34 .21	27.57 .12	2.39 .14	2.44 .21	19.84 .13	1.73 .14	24.52 1.53	32.
Dec. 5.3	43.13 .20	27.44 .12	2.25 .14	2.22 .22	19.71 .13	1.58 .15	22.95 1.59	32.
15.3	42.93 .20	27.32 .11	2.11 .14	2.01 .22	19.58 .13	1.43 .15	21.34 1.60	32.
25.2	42.74 − .20	27.21 − .10	1.97 − .13	1.79 − .22	19.45 − .12	1.28 − .14	19.75 −1.54	32.
35.2	42.54 − .20	27.12 − .08	1.84 − .13	1.57 − .22	19.33 − .11	1.14 − .14	18.27 −1.42	32.

Note.—For mean time interval of semidiameter passing meridian, subtract [illegible]

NOTE.—For mean time interval of [illegible]

Note.—For mean time interval of semidiameter passing meridian, subtract $0^s.18$ from the sidereal interval.

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Note.—For mean time interval of semidiameter passing meridian, subtract 0.18 from the sidereal interval.

NOTE.—For mean time interval of semidiameter passing meridian, subtract $0^{s}.19$ from the sidereal inter-

AT TRANSIT OF MOON'S CENTRE OVER THE MERIDIAN OF W

AT TRANSIT OF MOON'S CENTRE OVER THE MERIDIAN OF

FOR TRANSIT AT WASHINGTON.

Date.	Mean Time of Transit.	Apparent R. Ascension at Transit.	Apparent Declination at Transit.	Hor. Par.	Semi-diam.	S.T. of Sem. Pass. Mer.
	h m	h m s	° ′ ″	″	″	s
Apr. 1	0 42.3	1 22 17.54	+12 13 36.7	13.3	5.0	0.34
2	0 37.1	1 21 4.79	12 3 31.6	13.6	5.1	0.35
3	0 31.6	1 19 32.96	11 49 47.0	13.9	5.2	0.36
4	0 25.9	1 17 44.41	11 32 35.9	14.1	5.3	0.36
5	0 19.9	1 15 41.77	11 12 14.5	14.4	5.4	0.37
6	0 13.8	1 13 27.83	+10 49 2.5	14.7	5.5	0.38
7	0 7.6	1 11 5.59	10 23 22.3	14.9	5.6	0.38
8	0 1.2	1 8 38.14	9 55 39.1	15.0	5.6	0.38
8	23 54.6	1 6 8.56	9 26 19.9	15.1	5.7	0.38
9	23 48.4	1 3 39.89	8 55 53.4	15.2	5.7	0.39
10	23 42.0	1 1 15.05	+ 8 24 48.9	15.3	5.8	0.39
11	23 35.7	0 58 56.69	7 53 34.9	15.3	5.8	0.39
12	23 29.6	0 56 47.24	7 22 39.2	15.2	5.8	0.39
13	23 23.8	0 54 48.84	6 52 28.0	15.2	5.8	0.38
14	23 18.2	0 53 3.35	6 23 24.7	15.1	5.7	0.38
15	23 12.7	0 51 32.25	+ 5 55 50.3	15.0	5.7	0.38
16	23 7.5	0 50 16.74	5 30 2.8	14.9	5.6	0.37
17	23 2.5	0 49 17.69	5 6 17.1	14.7	5.6	0.37
18	22 57.9	0 48 35.69	4 44 45.1	14.5	5.5	0.37
19	22 53.6	0 48 11.12	4 25 36.0	14.4	5.4	0.36
20	22 49.6	0 48 4.12	+ 4 8 56.4	14.2	5.3	0.36
21	22 45.8	0 48 14.62	3 54 50.3	14.0	5.2	0.35
22	22 42.3	0 48 42.42	3 43 20.0	13.7	5.2	0.35
23	22 39.1	0 49 27.22	3 34 26.0	13.5	5.1	0.34
24	22 36.2	0 50 28.60	3 28 7.1	13.2	5.0	0.33
25	22 33.6	0 51 46.07	+ 3 24 21.4	13.0	4.9	0.33
26	22 31.2	0 53 19.13	3 23 6.0	12.8	4.8	0.32
27	22 29.0	0 55 7.23	3 24 17.1	12.5	4.7	0.31
28	22 27.1	0 57 9.79	3 27 50.5	12.3	4.7	0.31
29	22 25.5	0 59 26.26	3 33 41.4	12.1	4.6	0.30
30	22 24.0	1 1 56.12	+ 3 41 45.3	11.9	4.5	0.30
May 1	22 22.8	1 4 38.82	3 51 57.1	11.7	4.4	0.29
2	22 21.8	1 7 33.87	4 4 11.9	11.5	4.3	0.28
3	22 21.0	1 10 40.80	4 18 24.6	11.2	4.3	0.28
4	22 20.3	1 13 59.19	4 34 30.2	11.0	4.2	0.27
5	22 19.8	1 17 28.67	+ 4 52 23.9	10.8	4.1	0.27
6	22 19.6	1 21 8.89	5 12 1.0	10.6	4.0	0.27
7	22 19.5	1 24 59.53	5 33 16.6	10.4	3.9	0.26
8	22 19.6	1 29 0.33	5 56 6.2	10.2	3.9	0.26
9	22 19.8	1 33 11.05	6 20 25.3	10.0	3.8	0.25
10	22 20.2	1 37 31.51	+ 6 46 9.6	9.8	3.7	0.25
11	22 20.7	1 42 1.58	7 13 14.8	9.6	3.7	0.25
12	22 21.4	1 46 41.17	7 41 36.8	9.5	3.6	0.24
13	22 22.3	1 51 30 20	8 11 11.2	9.3	3.5	0.24
14	22 23.4	1 56 28.65	8 41 53.9	9.1	3.5	0.23
15	22 24.6	2 1 36.54	+ 9 13 40.7	9.0	3.4	0.23
16	22 25.9	2 6 53.90	+ 9 46 27.6	8.9	3.4	0 23

Date.	Mean Time of Transit.	Apparent R. Ascension at Transit.	Apparent Declination at Transit.	Hor. Par.	Semi-diam.
	h m	h m s	° ′ ″	″	″
May 16	22 25.9	2 6 53.90	+ 9 46 27.6	8.9	3.4
17	22 27.4	2 12 20.84	10 20 10.2	8.7	3.3
18	22 29.1	2 17 57.46	10 54 44.2	8.5	3.2
19	22 30.9	2 23 43.90	11 30 5.1	8.4	3.2
20	22 32.9	2 29 40.34	12 6 8.4	8.2	3.1
21	22 35.0	2 35 46.95	+12 42 49.2	8.1	3.1
22	22 37.3	2 42 3.98	13 20 2.2	8.0	3.0
23	22 39.8	2 48 31.68	13 57 41.9	7.9	3.0
24	22 42.5	2 55 10.28	14 35 42.6	7.8	2.9
25	22 45.4	3 2 0.03	15 13 58.2	7.7	2.9
26	22 48.5	3 9 1.17	+15 52 21.7	7.6	2.9
27	22 51.8	3 16 13.93	16 30 45.4	7.5	2.8
28	22 55.3	3 23 38.50	17 9 1.6	7.4	2.8
29	22 58.9	3 31 15.06	17 47 1.7	7.3	2.8
30	23 2.7	3 39 3.70	18 24 36.3	7.2	2.7
31	23 6.7	3 47 4.43	+19 1 35.4	7.1	2.7
June 1	23 11.0	3 55 17.18	19 37 48.3	7.0	2.7
2	23 15.5	4 3 41.77	20 13 3.5	6.9	2.6
3	23 20.2	4 12 17.89	20 47 9.2	6.8	2.6
4	23 25.0	4 21 5.04	21 19 53.0	6.8	2.6
5	23 30.0	4 30 2.54	+21 51 2.7	6.8	2.6
6	23 35.1	4 39 9.58	22 20 25.5	6.8	2.6
7	23 40.4	4 48 25.17	22 47 49.4	6.7	2.5
8	23 45.8	4 57 48.12	23 13 2.9	6.7	2.5
9	23 51.3	5 7 17.09	23 35 55.5	6.7	2.5
10	23 56.9	5 16 50.65	+23 56 17.7	6.7	2.5
12	0 2.6	5 26 27.26	24 14 1.9	6.7	2.5
13	0 8.3	5 36 5.29	24 29 2.1	6.7	2.5
14	0 13.9	5 45 43.13	24 41 13.8	6.7	2.5
15	0 19.5	5 55 19.19	24 50 34.9	6.7	2.5
16	0 25.1	6 4 51.94	+24 57 5.0	6.8	2.6
17	0 30.7	6 14 19.97	25 0 45.3	6.8	2.6
18	0 36.1	6 23 41.96	25 1 38.6	6.8	2.6
19	0 41.3	6 32 56.71	24 59 49.2	6.9	2.6
20	0 46.5	6 42 3.21	24 55 22.5	6.9	2.6
21	0 51.5	6 51 0.56	+24 48 25.0	7.0	2.6
22	0 56.4	6 59 48.03	24 39 3.3	7.0	2.6
23	1 1.0	7 8 24.99	24 27 25.2	7.1	2.7
24	1 5.5	7 16 50.95	24 13 38.6	7.2	2.7
25	1 9.8	7 25 5.53	23 57 51.3	7.3	2.7
26	1 13.9	7 33 8.47	+23 40 11.5	7.4	2.7
27	1 17.8	7 40 59.55	23 20 47.2	7.5	2.8
28	1 21.5	7 48 38.63	22 59 46.5	7.5	2.8
29	1 25.0	7 56 5.64	22 37 16.9	7.6	2.8
30	1 28.3	8 3 20.56	22 13 25.9	7.7	2.9
31	1 31.4	8 10 23.39	+21 48 20.8	7.8	2.9
32	1 34.3	8 17 14.14	+21 22 8 8	7.9	3.0

FOR TRANSIT AT W

FOR TRANSIT AT WASHINGTON.

Date.	Mean Time of Transit.	Apparent R. Ascension at Transit.	Apparent Declination at Transit.	Hor. Par.	Polar Semi-diam.	S.T. of Sem. Pass. Mer.
	h m	h m s	° ′ ″	″	″	s
Jan. 0	11 36.2	6 19 15.90	+22 32 1.9	1.1	9.7	0.75
1	11 31.9	6 18 54.75	22 32 18.6	1.1	9.7	0.75
2	11 27.6	6 18 33.67	22 32 35.2	1.1	9.7	0.75
3	11 23.3	6 18 12.60	22 32 51.7	1.1	9.7	0.75
4	11 19.1	6 17 51.81	22 33 8.1	1.1	9.7	0.75
5	11 14.8	6 17 31.06	+22 33 24.4	1.1	9.7	0.75
6	11 10.6	6 17 10.43	22 33 40.5	1.1	9.7	0.75
7	11 6.3	6 16 49.95	22 33 56.5	1.1	9.7	0.75
8	11 2.0	6 16 29.63	22 34 12.4	1.1	9.7	0.75
9	10 57.7	6 16 9.48	22 34 28.2	1.1	9.7	0.75
10	10 53.5	6 15 49.50	+22 34 43.9	1.1	9.7	0.75
11	10 49.2	6 15 29.72	22 34 59.4	1.1	9.7	0.75
12	10 44.9	6 15 10.14	22 35 14.8	1.1	9.7	0.75
13	10 40.7	6 14 50.77	22 35 30.1	1.1	9.7	0.75
14	10 36.4	6 14 31.63	22 35 45.2	1.1	9.6	0.75
15	10 32.2	6 14 12.72	+22 36 0.2	1.1	9.6	0.75
16	10 27.9	6 13 54.06	22 36 15.1	1.1	9.6	0.74
17	10 23.7	6 13 35.65	22 36 29.8	1.1	9.6	0.74
18	10 19.5	6 13 17.51	22 36 44.4	1.1	9.6	0.74
19	10 15.3	6 12 59.64	22 36 58.9	1.1	9.6	0.74
20	10 11.0	6 12 42.06	+22 37 13.3	1.1	9.6	0.74
21	10 6.8	6 12 24.77	22 37 27.5	1.1	9.6	0.74
22	10 2.6	6 12 7.77	22 37 41.6	1.1	9.6	0.74
23	9 58.4	6 11 51.09	22 37 55.6	1.1	9.6	0.74
24	9 54.2	6 11 34.72	22 38 9.5	1.1	9.6	0.74
25	9 50.0	6 11 18.68	+22 38 23.2	1.1	9.6	0.74
26	9 45.8	6 11 2.98	22 38 36.8	1.1	9.5	0.74
27	9 41.6	6 10 47.62	22 38 50.3	1.1	9.5	0.74
28	9 37.4	6 10 32.61	22 39 3.7	1.1	9.5	0.74
29	9 33.3	6 10 17.97	22 39 16.9	1.1	9.5	0.73
30	9 29.1	6 10 3.69	+22 39 30.0	1.1	9.5	0.73
31	9 24.9	6 9 49.79	22 39 43.1	1.1	9.5	0.73
Feb. 1	9 20.8	6 9 36.28	22 39 56.0	1.1	9.5	0.73
2	9 16.6	6 9 23.16	22 40 8.8	1.1	9.5	0.73
3	9 12.5	6 9 10.43	22 40 21.4	1.1	9.4	0.73
4	9 8.3	6 8 58.12	+22 40 34.0	1.1	9.4	0.73
5	9 4.2	6 8 46.22	22 40 46.4	1.1	9.4	0.73
6	9 0.1	6 8 34.74	22 40 58.8	1.1	9.4	0.73
7	8 56.0	6 8 23.69	22 41 11.0	1.1	9.4	0.73
8	8 51.9	6 8 13.06	22 41 23.2	1.1	9.4	0.72
9	8 47.8	6 8 2.88	+22 41 35.3	1.1	9.4	0.72
10	8 43.7	6 7 53.13	22 41 47.3	1.1	9.4	0.72
11	8 39.6	6 7 43.83	22 41 59.2	1.1	9.3	0.72
12	8 35.5	6 7 34.98	22 42 11.0	1.1	9.3	0.72
13	8 31.4	6 7 26.58	22 42 22.7	1.0	9.3	0.72
14	8 27.4	6 7 18.63	+22 42 34.3	1.0	9.3	0.72
15	8 23.3	6 7 11.14	+22 42 45.9	1.0	9.3	0.72

Date.	Mean Time of Transit.	Apparent R. Ascension at Transit.	Apparent Declination at Transit.	Hor. Par.	Polar Semi-diam.	S.T. of Sem. Pass. Mer.
	h m	h m s	° ′ ″	″	″	s
Feb. 14	8 27.4	6 7 18.63	+22 42 34.3	1.0	9.3	0.72
15	8 23.3	6 7 11.14	22 42 45.9	1.0	9.3	0.72
16	8 19.3	6 7 4.11	22 42 57.4	1.0	9.3	0.72
17	8 15.2	6 6 57.54	22 43 8.8	1.0	9.3	0.71
18	8 11.2	6 6 51.44	22 43 20.2	1.0	9.2	0.71
19	8 7.2	6 6 45.81	+22 43 31.5	1.0	9.2	0.71
20	8 3.1	6 6 40.66	22 43 42.7	1.0	9.2	0.71
21	7 59.1	6 6 35.97	22 43 53.8	1.0	9.2	0.71
22	7 55.2	6 6 31.76	22 44 4.9	1.0	9.2	0.71
23	7 51.2	6 6 28.03	22 44 15.8	1.0	9.2	0.71
24	7 47.2	6 6 24.78	+22 44 26.7	1.0	9.1	0.71
25	7 43.2	6 6 22.00	22 44 37.5	1.0	9.1	0.71
26	7 39.2	6 6 19.71	22 44 48.2	1.0	9.1	0.70
27	7 35.3	6 6 17.90	22 44 58.8	1.0	9.1	0.70
28	7 31.3	6 6 16.58	22 45 9.3	1.0	9.1	0.70
Mar. 1	7 27.3	6 6 15.74	+22 45 19.8	1.0	9.1	0.70
2	7 23.4	6 6 15.40	22 45 30.2	1.0	9.0	0.70
3	7 19.5	6 6 15.54	22 45 40.5	1.0	9.0	0.70
4	7 15.6	6 6 16.17	22 45 50.8	1.0	9.0	0.70
5	7 11.7	6 6 17.29	22 46 0.9	1.0	9.0	0.70
6	7 7.8	6 6 18.90	+22 46 10.9	1.0	9.0	0.69
7	7 3.9	6 6 21.00	22 46 20.9	1.0	9.0	0.69
8	7 0.0	6 6 23.59	22 46 30.7	1.0	8.9	0.69
9	6 56.1	6 6 26.66	22 46 40.5	1.0	8.9	0.69
10	6 52.2	6 6 30.21	22 46 50.1	1.0	8.9	0.69
11	6 48.3	6 6 34.25	+22 46 59.7	1.0	8.9	0.69
12	6 44.5	6 6 38.77	22 47 9.2	1.0	8.9	0.69
13	6 40.6	6 6 43.77	22 47 18.5	1.0	8.9	0.68
14	6 36.8	6 6 49.25	22 47 27.8	1.0	8.8	0.68
15	6 33.0	6 6 55.20	22 47 36.8	1.0	8.8	0.68
16	6 29.1	6 7 1.63	+22 47 45.8	1.0	8.8	0.68
17	6 25.3	6 7 8.52	22 47 54.7	1.0	8.8	0.68
18	6 21.5	6 7 15.88	22 48 3.4	1.0	8.8	0.68
19	6 17.7	6 7 23.70	22 48 12.0	1.0	8.8	0.68
20	6 13.9	6 7 31.98	22 48 20.4	1.0	8.7	0.68
21	6 10.1	6 7 40.73	+22 48 28.8	1.0	8.7	0.67
22	6 6.3	6 7 49.93	22 48 36.9	1.0	8.7	0.67
23	6 2.6	6 7 59.50	22 48 44.9	1.0	8.7	0.67
24	5 58.8	6 8 9.70	22 48 52.8	1.0	8.7	0.67
25	5 55.1	6 8 20.27	22 49 0.5	1.0	8.7	0.67
26	5 51.3	6 8 31.27	+22 49 7.9	1.0	8.6	0.67
27	5 47.6	6 8 42.71	22 49 15.2	1.0	8.6	0.67
28	5 43.8	6 8 54.60	22 49 22.3	1.0	8.6	0.67
29	5 40.1	6 9 6.93	22 49 29.2	1.0	8.6	0.67
30	5 36.4	6 9 19.69	22 49 35.9	1.0	8.6	0.67
31	5 32.7	6 9 32.89	+22 49 42.4	1.0	8.6	0.66
32	5 29.0	6 9 46.51	+22 49 48.7	1.0	8.6	0.66

FOR TRANSIT AT WASHINGTON.

Date.	Mean Time of Transit
	h m
an. 0	17 45.
1	17 41.
2	17 37.
3	17 33.
4	17 29.
5	17 25.
6	17 21.
7	17 17.
8	17 14.
9	17 10.
10	17 6.
11	17 2.
12	16 58.
13	16 54.
14	16 50.
15	16 46.
16	16 42.
17	16 38.
18	16 34.
19	16 30.
20	16 26.
21	16 22.
22	16 18.
23	16 14.
24	16 10.
25	16 6.
26	16 2.
27	15 58.
28	15 54.
29	15 50.
30	15 46.
31	15 42.
'eb. 1	15 38.
2	15 34.
3	15 30.
4	15 26.
5	15 22.
6	15 18.
7	15 14.
8	15 10.
9	15 6.
10	15 2.
11	14 58.
12	14 54.
13	14 50.
14	14 46.
15	14 42.

FOR TRANSIT AT WASHINGTON.

Apparent Declination at Transit.	Hor. Par.	Semi-diam.	S.T. of Sem. Pass. Mer.
° ′ ″	″	″	s
+16 49 23.9	0.3	1.3	0.09
16 49 35.1	0.3	1.3	0.09
16 49 46.8	0.3	1.3	0.09
16 49 59.1	0.3	1.3	0.09
16 50 11.8	0.3	1.3	0.09
+16 50 25.0	0.3	1.3	0.09
16 50 38.7	0.3	1.3	0.09
16 50 52.9	0.3	1.3	0.09
16 51 7.6	0.3	1.3	0.09
16 51 22.7	0.3	1.3	0.09
+16 51 38.2	0.3	1.3	0.09
16 51 54.3	0.3	1.3	0.09
16 52 10.8	0.3	1.3	0.09
16 52 27.8	0.3	1.3	0.09
+16 52 45.2	0.3	1.3	0.09
+18 0 12.9	0.3	1.3	0.09
18 0 8.7	0.3	1.3	0.09
18 0 3.9	0.3	1.3	0.09
17 59 58.8	0.3	1.3	0.09
17 59 53.2	0.3	1.3	0.09
+17 59 47.2	0.3	1.3	0.09
17 59 40.6	0.3	1.3	0.09
17 59 33.9	0.3	1.3	0.09
17 59 26.7	0.3	1.3	0.09
17 59 19.0	0.3	1.3	0.09
+17 59 10.9	0.3	1.3	0.09
17 59 2.4	0.3	1.3	0.09
17 58 53.5	0.3	1.3	0.09
17 58 44.1	0.3	1.3	0.09
17 58 34.5	0.3	1.3	0.09
+17 58 24.4	0.3	1.3	0.09
17 58 13.9	0.3	1.3	0.09
17 58 3.0	0.3	1.3	0.09
17 57 51.7	0.3	1.3	0.09
17 57 40.1	0.3	1.3	0.09
+17 57 28.1	0.3	1.3	0.09
17 57 15.6	0.3	1.3	0.09
17 57 2.8	0.3	1.3	0.09
17 56 49.6	0.3	1.3	0.09
17 56 36.1	0.3	1.3	0.09
+17 56 22.2	0.3	1.3	0.09
17 56 7.9	0.3	1.3	0.09
17 55 53.3	0.3	1.3	0.09
17 55 38.4	0.3	1.3	0.09
17 55 21.2	0.3	1.3	0.09
+17 55 7.6	0.3	1.3	0.09
+17 54 51.6	0.3	1.3	0.09

FOR TRANSIT AT WASHINGTON.

Date.	Mean Time of Transit.	Apparent R. Ascension at Transit.	Apparent Declination at Transit.	Hor. Par.	Semi-diam.	S.T. of Sem. Pass. Mer.
	h m	h m s	° ′ ″	″	″	s
Oct. 1	14 59.0	3 42 51.15	+17 55 7.6	0.3	1.3	0.09
2	14 55.0	3 42 47.08	17 54 51.6	0.3	1.3	0.09
3	14 51.0	3 42 42.90	17 54 35.3	0.3	1.3	0.09
4	14 47.0	3 42 38.62	17 54 18.7	0.3	1.3	0.09
5	14 43.0	3 42 34.24	17 54 1.8	0.3	1.3	0.09
6	14 39.0	3 42 29.75	+17 53 44.6	0.3	1.3	0.09
7	14 34.9	3 42 25.17	17 53 27.1	0.3	1.3	0.09
8	14 30.9	3 42 20.48	17 53 9.3	0.3	1.3	0.09
9	14 26.9	3 42 15.68	17 52 51.3	0.3	1.3	0.09
10	14 22.9	3 42 10.79	17 52 32.9	0.3	1.3	0.09
11	14 18.9	3 42 5.81	+17 52 14.2	0.3	1.3	0.09
12	14 14.9	3 42 0.73	17 51 55.3	0.3	1.3	0.09
13	14 10.9	3 41 55.57	17 51 36.2	0.3	1.3	0.09
14	14 6.8	3 41 50.32	17 51 16.8	0.3	1.3	0.09
15	14 2.8	3 41 44.98	17 50 57.2	0.3	1.3	0.09
16	13 58.8	3 41 39.55	+17 50 37.3	0.3	1.3	0.09
17	13 54.8	3 41 34.03	17 50 17.2	0.3	1.3	0.09
18	13 50.8	3 41 28.42	17 49 56.8	0.3	1.3	0.09
19	13 46.7	3 41 22.75	17 49 36.2	0.3	1.3	0.09
20	13 42.7	3 41 17.00	17 49 15.4	0.3	1.3	0.09
21	13 38.7	3 41 11.17	+17 48 54.4	0.3	1.3	0.09
22	13 34.6	3 41 5.28	17 48 33.2	0.3	1.3	0.09
23	13 30.6	3 40 59.31	17 48 11.8	0.3	1.3	0.09
24	13 26.6	3 40 53.27	17 47 50.3	0.3	1.3	0.09
25	13 22.6	3 40 47.16	17 47 28.5	0.3	1.3	0.09
26	13 18.5	3 40 40.98	+17 47 6.6	0.3	1.3	0.09
27	13 14.5	3 40 34.74	17 46 44.5	0.3	1.3	0.09
28	13 10.4	3 40 28.45	17 46 22.3	0.3	1.3	0.09
29	13 6.4	3 40 22.11	17 45 59.9	0.3	1.3	0.09
30	13 2.4	3 40 15.72	17 45 37.4	0.3	1.3	0.09
31	12 58.3	3 40 9.27	+17 45 14.8	0.3	1.3	0.09
Nov. 1	12 54.3	3 40 2.77	17 44 52.1	0.3	1.3	0.09
2	12 50.3	3 39 56.22	17 44 29.3	0.3	1.3	0.09
3	12 46.2	3 39 49.63	17 44 6.4	0.3	1.3	0.09
4	12 42.2	3 39 43.00	17 43 43.4	0.3	1.3	0.09
5	12 38.1	3 39 36.34	+17 43 20.3	0.3	1.3	0.09
6	12 34.1	3 39 29.64	17 42 57.2	0.3	1.3	0.09
7	12 30.1	3 39 22.92	17 42 34.0	0.3	1.3	0.09
8	12 26.0	3 39 16.16	17 42 10.8	0.3	1.3	0.09
9	12 22.0	3 39 9.37	17 41 47.5	0.3	1.3	0.09
10	12 17.9	3 39 2.55	+17 41 24.2	0.3	1.3	0.09
11	12 13.9	3 38 55.70	17 41 0.8	0.3	1.3	0.09
12	12 9.8	3 38 48.84	17 40 37.4	0.3	1.3	0.09
13	12 5.8	3 38 41.98	17 40 14.0	0.3	1.3	0.09
14	12 1.7	3 38 35.10	17 39 50.7	0.3	1.3	0.09
15	11 57.7	3 38 28.21	+17 39 27.4	0.3	1.3	0.09
16	*11 53.6*	3 38 21.31	+17 39 4.1	0.3	1.3	0.09

Date.	Mean Time of Transit.	Apparent R. Ascension at Transit.	Apparent Declination at Transit.	Hor. Par.	Semi-diam.
	h m	h m s	° ′ ″	″	″
Nov. 16	11 53.6	3 38 21.31	+17 39 4.1	0.3	1.3
17	11 49.6	3 38 14.40	17 38 40.8	0.3	1.3
18	11 45.5	3 38 7.48	17 38 17.5	0.3	1.3
19	11 41.5	3 38 0.56	17 37 54.2	0.3	1.3
20	11 37.4	3 37 53.65	17 37 31.2	0.3	1.3
21	11 33.4	3 37 46.75	+17 37 8.1	0.3	1.3
22	11 29.3	3 37 39.86	17 36 45.2	0.3	1.3
23	11 25.3	3 37 32.99	17 36 22.3	0.3	1.3
24	11 21.3	3 37 26.12	17 35 59.6	0.3	1.3
25	11 17.2	3 37 19.26	17 35 36.9	0.3	1.3
26	11 13.2	3 37 12.41	+17 35 14.3	0.3	1.3
27	11 9.1	3 37 5.59	17 34 51.8	0.3	1.3
28	11 5.1	3 36 58.80	17 34 29.5	0.3	1.3
29	11 1.0	3 36 52.05	17 34 7.4	0.3	1.3
30	10 57.0	3 36 45.34	17 33 45.5	0.3	1.3
Dec. 1	10 53.0	3 36 38.65	+17 33 23.7	0.3	1.3
2	10 48.9	3 36 32.00	17 33 2.1	0.3	1.3
3	10 44.9	3 36 25.38	17 32 40.6	0.3	1.3
4	10 40.8	3 36 18.80	17 32 19.3	0.3	1.3
5	10 36.8	3 36 12.26	17 31 58.3	0.3	1.3
6	10 32.7	3 36 5.78	+17 31 37.4	0.3	1.3
7	10 28.7	3 35 59.35	17 31 16.8	0.3	1.3
8	10 24.7	3 35 52.98	17 30 56.5	0.3	1.3
9	10 20.6	3 35 46.66	17 30 36.3	0.3	1.3
10	10 16.6	3 35 40.40	17 30 16.4	0.3	1.3
11	10 12.6	3 35 34.20	+17 29 56.8	0.3	1.3
12	10 8.5	3 35 28.05	17 29 37.4	0.3	1.3
13	10 4.5	3 35 21.96	17 29 18.2	0.3	1.3
14	10 0.5	3 35 15.95	17 28 59.4	0.3	[illegible]
15	9 56.4	3 35 10.01	17 28 40.9	0.3	1.3
16	9 52.4	3 35 4.15	+17 28 22.7	0.3	1.3
17	9 48.4	3 34 58.36	17 28 4.8	0.3	1.3
18	9 44.3	3 34 52.64	17 27 47.2	0.3	1.3
19	9 40.3	3 34 47.00	17 27 29.9	0.3	1.3
20	9 36.3	3 34 41.43	17 27 12.9	0.3	1.3
21	9 32.3	3 34 35.95	+17 26 56.2	0.3	1.3
22	9 28.3	3 34 30.56	17 26 39.9	0.3	1.3
23	9 24.2	3 34 25.26	17 26 24.0	0.3	1.3
24	9 20.2	3 34 20.06	17 26 8.5	0.3	1.3
25	9 16.2	3 34 14.95	17 25 53.2	0.3	1.3
26	9 12.2	3 34 9.93	+17 25 38.4	0.3	1.3
27	9 8.2	3 34 5.00	17 25 23.9	0.3	1.3
28	9 4.2	3 34 0.16	17 25 9.9	0.3	1.3
29	9 0.1	3 33 55.43	17 24 56.2	0.3	1.3
30	8 56.1	3 33 50.81	17 24 42.9	0.3	1.3
31	8 52.1	3 33 46.29	+17 24 30.1	0.3	1.3
32	8 48.1	3 33 41.89	+17 24 17.6	0.3	1.3

PART III

PHENOMENA

EPH 46—36—11

ECLIPSES IN 1886.

In the year 1886 there will be two eclipses, both of the sun.

I.—*An Annular Eclipse of the Sun*, 1886, March 5, visible at Washington as a partial eclip

ELEMENTS OF THE ECLIPSE.

Greenwich mean time of ☌ in right ascension, March 5d 10h 8m 56.4s

Sun and moon's R. A.	23h 5m 50.3s	Hourly motions	9.28s and 115.8
Sun's declination	5° 47′ 56.6″ S.	Hourly motion	0′ 58.1
Moon's declination	5 42 29.3 S.	Hourly motion	9 3.9
Sun's equa. hor. parallax	8.9	Sun's true semidiameter	16 7.
Moon's equa. hor. parallax	54 29.6	Moon's true semidiameter	14 50.

CIRCUMSTANCES OF THE ECLIPSE.

		d h m		° ′		° ′
Eclipse begins	March	5 7 1.1	in long.	166 13.2 E.	and in lat.	13 27.
Central eclipse begins		5 8 8.3		149 37.1 E.		11 28.
Central eclipse at noon		5 10 8.9		149 20.9 W.		0 0.
Central eclipse ends		5 12 2.5		90 9.4 W.		22 31.
Eclipse ends		5 13 9.7		106 43.5 W.		20 32.

II.—*A Total Eclipse of the Sun*, 1886, August 28–29, visible at Washington as a partial ecl

ELEMENTS OF THE ECLIPSE.

Greenwich mean time of ☌ in right ascension, August 29d 0h 58m 32.5s

Sun and moon's R. A.	10h 31m 23.52s	Hourly motions	9.12s and 148.
Sun's declination	9° 17′ 23.8″ N.	Hourly motion	0′ 53.
Moon's declination	9 10 38.5 N.	Hourly motion	10 43.
Sun's equa. hor. parallax	8.8	Sun's true semidiameter	15 50.
Moon's equa. hor. parallax	61 21.7	Moon's true semidiameter	16 42.

CIRCUMSTANCES OF THE ECLIPSE.

		d h m		° ′		° ′
Eclipse begins	August	28 22 18.4	in long.	66 23.2 W.	and in lat.	11 54.
Central eclipse begins		28 23 13.3		79 44.4 W.		9 48.
Central eclipse at noon		29 0 58.5		14 26.6 W.		2 58.
Central eclipse ends		29 2 37.5		47 2.3 E.		21 54.
Eclipse ends		29 3 32.4		33 43.0 E.		19 48.

The regions within which these eclipses of the sun are visible are laid down on the follow charts, from which may also be found the Greenwich time of beginning or ending wi fifteen or twenty minutes, by means of the dotted lines.

	50
	55
11	0
	5
	10
	15
	20
	25
	30
	35
	40
	45
	50
	55
12	0
Liv	

WASHINGTON MEAN TIME.

PHASES OF THE MOON.

New Moon.	d	h	m	First Quarter.	d	h	m	Full Moon.	d	h	m	Last Quarter.	d	h	m
January	4	14	35.5	January	12	19	16.2	January	19	14	36.6	January	26	8	23.1
February	3	10	6.4	February	11	9	38.0	February	18	1	6.8	February	25	0	3.1
March	5	4	56.1	March	12	20	9.0	March	19	11	28.4	March	26	17	36.0
April	3	21	22.4	April	11	3	35.8	April	17	21	50.9	April	25	12	7.2
May	3	10	34.3	May	10	9	12.4	May	17	8	38.9	May	25	6	27.9
June	1	20	47.1	June	8	14	18.5	June	15	20	30.6	June	23	23	26.6
July	1	4	58.4	July	7	20	9.9	July	15	10	0.7	July	23	14	13.1
July	30	12	17.7	August	6	3	58.0	August	14	1	16.0	August	22	2	33.6
August	28	19	46.1	September	4	14	47.3	September	12	17	42.1	September	20	12	47.6
September	27	4	10.4	October	4	5	25.2	October	12	10	15.7	October	19	21	32.6
October	26	14	7.2	November	2	23	57.0	November	11	1	58.3	November	18	5	32.2
November	25	2	10.3	December	2	21	16.8	December	10	16	22.0	December	17	13	30.9
December	24	16	46.5												

APOGEE, PERIGEE, AND GREATEST LIBRATION.

Apogee.	d	h	Perigee.	d	h	Greatest Libration.	d	h	m			d	h	m	
January	6	16.1	January	19	20.2	January	13	20	37	E.	January	25	22	19	W.
February	2	17.2	February	17	9.0	February	11	2	57	E.	February	23	6	18	W.
March	1	23.7	March	17	17.6	March	10	22	29	E.	March	23	12	0	W.
March	29	15.8	April	14	12.4	April	6	15	6	E.	April	20	9	44	W.
April	26	11.0	May	10	7.4	May	3	0	6	E.	May	17	16	27	W.
May	24	6.2	June	5	5.7	May	30	7	47	E.	June	13	1	53	W.
June	20	23.8	July	3	0.0	June	27	4	30	E.	July	9	19	34	W.
July	18	13.6	July	31	5.9	July	25	7	44	E.	August	6	13	2	W.
August	14	20.6	August	28	19.9	August	22	13	7	E.	September	3	16	20	W.
September	10	22.3	September	26	1.9	September	19	15	38	E.	October	1	21	52	W.
October	8	8.3	October	24	6.7	October	17	2	9	E.	October	30	0	36	W.
November	5	1.4	November	20	14.2	November	12	6	53	E.	November	26	18	13	W.
December	2	21.8	December	15	6.9	December	9	2	2	E.	December	23	14	45	W.
December	30	19.1													

FORMULÆ FOR THE LIBRATION OF THE MOON.

Put I, the inclination of the moon's equator to the ecliptic ($= 1° 28'.8$),

Ω, the mean longitude of the moon's ascending node, (see page 278), or the mean longitude of the descending node of the moon's equator,

C, the angle at the centre of the moon's disk made by a lunar meridian with the circle of declination, counted from north to east on the apparent disk,

λ, β, α', δ', the apparent longitude, latitude, right ascension, and declination of the moon, corrected for parallax,

λ', the selenocentric longitude of the earth, counted on the moon's equator from its descending node, Ω,

i, Δ, Ω', ☾, the quantities defined on page 276, where their values for the year are given.

The moon's libration in longitude and latitude may then be found, for any time, by means of the following formulæ, in connection with the tables given on pages 276 and 277: —

$$\left.\begin{aligned} \Delta\lambda &= -0'.57 \sin 2(\Omega - \lambda) \\ a &= \sin I \cos(\Omega - \lambda) \\ \tan B &= \tan I \sin(\Omega - \lambda) \\ \lambda' &= \lambda + \Delta\lambda + ab \end{aligned}\right\} \textit{See table, page 277}$$

$$\text{The libration in latitude} = b = B - \beta$$

$$\text{The libration in longitude} = l = \lambda' - ☾$$

$$\sin C = \sin i \frac{\cos(\lambda' + \Delta - \Omega)}{\cos \delta'} = -\sin i \frac{\cos(\alpha' - \Omega')}{\cos b}$$

ELEMENTS FOR THE PREDICTION OF OCCULTATIONS.

MARCH.

The Stars					At Conjunction in R. A.					Lim. Par.
Name.	Mag.	Red'n from 1886.0 1st	Red'n from 1886.0 2d	Apparent Declination.	Washington Mean Time.	Hour Angle H	Y	x'	y'	N
		s	'	° '	d h m	h m				
49 Libræ	6	+1.32	+2.2	−16 11.2	23 17 42.2	+ 2 53.7	+1.1132	0.5640	−0.1660	+
φ Ophiuchi	4½	1.16	3.6	16 21.3	24 9 35.4	− 7 39.4	−0.0071	0.5622	0.0635	+
24 Scorpii	5½	1.12	4.2	17 31.2	11 18.1	− 3 6.4	+0.5692	0.5614	−0.0765	+
B.A.C. 6204	5½	0.51	7.1	18 22.7	26 16 1.3	− 2 4.6	+0.1322	0.5516	+0.0064	+
ρ Sagittarii	4	+0.22	7.2	18 3.6	27 15 56.2	− 2 50.0	+0.2517	0.5470	0.0430	+
ρ² Sagittarii	6½	+0.22	+ 7.3	−18 31.1	16 0.2	− 2 52.1	+0.2776	0.5450	+0.0432	+
B.A.C. 6719	6	0.14	7.1	18 29.0	23 21.2	− 4 14.9	+1.1674	0.5441	0.0746	+
e¹ Sagittarii	5½	0.12	6.4	16 33.2	28 1 10.3	+ 6 9.4	−0.2934	0.5436	0.0674	−
e² Sagittarii	5½	+0.11	6.4	16 23.2	2 2.8	+ 6 51.3	−1.0652	0.5436	0.0657	−
β Capricorni	3	−0.10	5.5	15 8.4	20 50.3	+ 1 9.3	−1.7645	0.5390	0.0651	−
B.A.C. 7062	6½	−0.16	+ 5.3	−15 26.1	29 1 57.4	+ 6 1.2	−0.3020	0.5370	+0.0814	+
π Capricorni	6½	0.17	5.3	15 32.4	5 2.5	+ 9 0.5	+0.1016	0.5372	0.0855	+
ρ Capricorni	5½	0.20	5.2	15 21.2	6 8.3	+ 9 56.5	−0.0129	0.5370	0.0867	−
Lalande 40622	6	0.30	4.7	14 55.3	15 44.7	− 4 37.0	+0.5002	0.5348	0.1086	−
5 Aquarii	6½	0.29	4.3	13 29.6	16 22.4	− 4 0.4	−1.0053	0.5347	0.1096	−
9 Aquarii	6½	−0.30	+ 4.4	−13 50.5	16 50.8	− 3 25.2	−0.4047	0.5347	+0.1110	+
18 Aquarii	5½	0.40	3.6	13 21.9	30 4 38.1	+ 7 52.9	+0.2770	0.5327	0.1280	+
ι Capricorni	5½	0.47	2.5	11 53.5	16 2.6	− 5 3.1	+0.1144	0.5310	0.1342	+
B.A.C. 7620	6½	0.49	1.9	10 50.9	19 40.6	− 1 31.6	−0.5459	0.5305	0.1380	
B.A.C. 7774	6½	0.57	+ 0.8	9 36.5	31 7 38.7	+10 5.1	−0.2023	0.5286	0.1480	+
67 Aquarii	6½	−0.64	− 0.7	− 7 33.6	21 15.7	− 0 42.2	−0.3727	0.5288	+0.1581	+

APRIL.

Name.	Mag.	Red'n 1st	Red'n 2d	Apparent Declination.	Washington Mean Time.	Hour Angle H	Y	x'	y'	N
λ Aquarii	4	−0.67	− 0.9	− 8 11.2	1 2 6.3	+ 3 59.9	+1.0914	0.5288	+0.1612	+
78 Aquarii	6½	−0.68	− 1.0	− 7 42.6	3 7.1	+ 4 [illegible]	+0.8412	0.5285	+0.1619	+
81 Aquarii	6½	0.69	1.3	7 40.4	6 [illegible]	+ 8 24.7	+1.2642	[illegible]	0.1642	+
82 Aquarii	6½	0.69	1.4	7 11.2	7 14.0	[illegible]	[illegible]	[illegible]	0.1643	+
φ Aquarii	4	0.72	2.0	6 29.8	17 27.4	[illegible]	[illegible]	0.5287	0.1674	+
86 Aquarii	5½	0.72	2.4	5 44.0	17 [illegible]	− 6 [illegible]	[illegible]	[illegible]	0.1687	+
B.A.C. 8184	6	−0.73	− 2.9	− 5 9.3	21 11.0	− 1 [illegible]	[illegible]	0.5293	+0.1710	+
20 Piscium	5½	0.75	3.8	− 3 23.8	2 6 41.7	+ 7 44.5	+0.6733	0.5300	0.1743	+
				NEW	MOON.					
64 Ceti	5½	0.68	8.8	+ 8 2.1	5 6 16.8	+ 5 5.3	+0.7154	0.5402	0.1698	+
ξ¹ Ceti	4	−0.67	− 8.8	+ 8 18.6	7 3.4	+ 7 53.4	+0.7466	0.5405	+0.1663	+
ξ Arietis	5	0.64	9.0	10 5.5	12 29.3	+11 18.4	−0.4641	0.5521	0.1550	+
B.A.C. 755	6½	0.65	9.0	10 3.6	13 34.5	−11 48.1	−0.2745	0.5523	0.1551	+
85 Ceti	6	0.62	9.4	10 15.1	20 58.4	− 4 38.7	+0.6830	0.5574	0.1480	+
38 Arietis	5	0.60	9.2	11 57.8	22 5.0	− 3 33.4	−1.0065	0.5550	0.1470	−
Lalande 5725	6	−0.56	− 9.5	+12 44.9	6 8 0.0	+ 6 1.8	−0.4290	0.5600	+0.1377	+
f Tauri	4	0.50	10.0	12 32.5	19 9.4	− 7 12.4	+1.2575	0.5640	0.1247	+
42 Tauri	6	0.33	10.1	15 6.8	7 15 1.7	+11 58.4	+0.7636	0.5728	0.0960	+
ι Tauri	4	0.33	10.2	15 21.0	16 46.7	−10 20.3	+0.6831	0.5740	0.0940	+
52 Tauri	6	0.34	10.4	14 40.1	17 8.5	− 9 50.2	+1.2726	0.5747	0.0937	+
δ Tauri	4	−0.32	− 9.7	+17 16.3	18 6.6	− 9 3.3	−1.1954	0.5752	+0.0921	−
63 Tauri	6	0.32	10.0	16 30.4	18 20.1	− 8 50.2	−0.3770	0.5752	0.0910	+
δ² Tauri	5½	0.31	9.8	17 10.6	18 36.0	− 8 34.0	−1.0510	0.5754	0.0910	−
70 Tauri	6	0.31	10.2	15 40.6	19 18.4	− 7 54.0	+0.5749	0.5756	0.0906	+
71 Tauri	6	0.31	10.3	15 21.4	19 37.6	− 7 35.4	+0.9376	0.5758	0.0895	+
75 Tauri	6	−0.28	− 9.3	+16 6.1	20 31.5	− 6 43.5	+0.2413	0.5762	+0.0880	+
θ¹ Tauri	4	0.30	10.3	15 42.4	20 35.1	− 6 40.1	+0.6580	0.5762	0.0880	+
θ² Tauri	4	0.30	10.3	15 36.9	20 37.6	− 6 37.6	+0.7568	0.5762	0.0878	+
80 Tauri	6	0.31	10.4	15 23.1	21 16.5	− 6 0.1	+1.0534	0.5762	0.0871	+
B.A.C. 1391	5	0.29	10.2	15 56.6	21 26.5	− 5 50.4	+0.4869	0.5765	0.0864	+
81 Tauri	6	−0.30	−10.4	+15 26.5	21 29.3	− 5 47.7	+1.0118	0.5766	+0.0864	+
85 Tauri	6½	−0.29	−10.3	+15 36.2	22 0.7	− 5 17.4	+0.8884	0.5766	+0.0859	+

ELEMENTS FOR THE PREDICTION OF OCCULTATIONS.

APRIL.

The Star's Name.	Mag.	Red'ns from 1886.0. Δα	Δδ	Apparent Declination.	At Conjunction in R. A. Washington Mean Time.	Hour Angle H	Y	x'	y'	Limi- Para. N.
		s	"	° ′	d h m	h m				
γ Libræ	4½	+1.96	− 0.7	−14 24.5	19 17 24.2	+ 3 48.8	+0.4031	0.5700	−0.1232	+52
η Libræ	6	1.94	0.0	15 18.5	21 10.8	+ 7 27.5	+0.8900	0.5700	0.1183	+75
49 Libræ	6	1.92	+ 1.1	16 11.8	20 4 24.2	− 9 34.2	+0.9984	0.5696	0.1068	+74
φ Ophiuchi	4½	1.84	2.6	16 21.9	18 3.5	+ 3 36.7	−0.1269	0.5686	0.0858	+17
24 Scorpii	5½	1.81	3.4	17 31.2	22 41.1	+ 8 4.7	+0.7171	0.5677	−0.0779	+73
B. A. C. 6244	5½	+1.34	+ 8.0	−18 24.7	23 0 26.9	+ 8 8.8	−0.0435	0.5568	+0.0065	+14
d Sagittarii	5	1.06	9.2	19 9.1	22 3.4	+ 5 2.7	+1.2103	0.5503	0.0409	+71
ρ^1 Sagittarii	4	1.04	8.9	18 3.6	23 59.5	+ 6 55.3	+0.0968	0.5497	0.0440	+25
ρ^2 Sagittarii	6½	1.04	9.0	18 31.1	24 0 3.7	+ 6 59.2	+0.6029	0.5497	0.0440	+60
B. A. C. 6710	6	0.95	9.2	18 28.9	7 19.2	− 9 59.5	+0.9262	0.5474	0.0549	+72
ϵ^1 Sagittarii	5½	+0.94	+ 8.6	−16 33.2	9 6.9	− 8 15.2	−1.0914	0.5466	+0.0577	−45
B. A. C. 7063	6½	0.63	8.2	15 26.1	25 9 41.2	− 8 27.5	−0.4785	0.5385	0.0920	− 1
τ^1 Capricorni	6½	0.59	8.4	15 32.4	12 45.3	− 5 29.1	−0.0755	0.5379	0.0959	+21
τ^2 Capricorni	5½	0.58	8.2	15 21.2	13 42.8	− 4 33.3	−0.1879	0.5375	0.0973	+17
Lalande 40522	6	0.47	7.8	14 55.3	23 25.0	+ 4 51.0	+0.3355	0.5349	0.1091	+47
8 Aquarii	6½	+0.47	+ 7.3	−13 29.6	26 0 2.7	+ 5 27.5	−1.1763	0.5347	+0.1095	−4
9 Aquarii	6½	0.46	7.5	13 58.5	0 38.9	+ 6 2.6	−0.5771	0.5339	0.1104	−
18 Aquarii	5½	0.32	7.0	13 21.9	12 17.2	− 6 40.2	+0.1069	0.5317	0.1230	+3
ι Capricorni	5½	0.30	6.0	11 53.4	23 42.0	+ 4 24.0	−0.0516	0.5293	0.1348	+27
B. A. C. 7680	6½	0.17	5.4	10 50.8	27 3 30.4	+ 7 55.9	−0.7076	0.5286	0.1378	−
B. A. C. 7774	6½	+0.07	+ 4.4	− 9 36.4	15 20.5	− 4 25.4	−0.3570	0.5270	+0.1453	+1
67 Aquarii	6½	−0.05	3.0	7 33.5	28 5 0.2	+ 8 50.1	−0.5158	0.5261	0.1584	+
λ Aquarii	4	0.11	2.8	8 11.2	9 52.0	−10 26.7	+0.9535	0.5261	0.1615	+
78 Aquarii	6½	0.11	2.6	7 48.6	10 53.1	− 9 27.4	+0.7057	0.5259	0.1622	+
81 Aquarii	6½	0.13	2.3	7 40.4	14 25.9	− 6 0.9	+1.1316	0.5260	0.1644	+
82 Aquarii	6½	−0.14	+ 2.1	− 7 11.2	15 1.9	− 5 25.9	+0.6958	0.5261	+0.1640	+
φ Aquarii	4	0.18	1.5	6 30.8	21 8.9	+ 0 30.3	+1.1368	0.5264	0.1678	+
96 Aquarii	5½	0.20	1.1	5 44.9	23 46.5	+ 3 3.2	+0.5906	0.5266	0.1693	+7
B. A. C. 8184	6	0.23	+ 0.5	5 9.3	29 5 2.1	+ 8 9.7	+0.8224	0.5268	0.1714	+
Venus				2 57.8	12 7.3	− 8 57.7	−0.3489	0.4875	0.1612	+1
20 Piscium	5½	−0.20	− 0.6	− 3 23.7	14 33.8	− 6 35.6	+0.5490	0.5279	+0.1751	+71
16 Ceti	6	0.30	2.7	− 0 40.8	30 10 23.4	−11 21.5	+1.1041	0.5322	0.1786	+
B. A. C. 237	6½	−0.44	− 4.1	+ 2 45.9	22 51.2	+ 0 43.8	−0.3895	0.5356	0.1784	−1

MAY.

The Star's Name.	Mag.	Δα	Δδ	Apparent Declination.	Washington Mean Time.	Hour Angle H	Y	x'	y'	N.
77 Piscium	6	−0.45	− 5.0	+ 4 18.0	1 6 5.5	+ 7 44.8	−0.7490	0.5383	+0.177[illegible]	−
Mercury				3 45.4	7 36.2	+ 9 12.7	+0.1005	0.5107	[illegible]	−4
95 Piscium	6½	0.48	6.2	6 42.2	17 32.1	− 5 9.9	−1.3065	0.5430	[illegible]	−
[illegible] Piscium	5	0.48	6.1	5 33.2	18 4.8	− 4 38.2	+0.0160	0.5431	[illegible]	−
				NEW	*MOON.*					
γ Tauri	4	−0.49	−10.2	+15 21.0	4 23 24.2	− 1 55.2	+0.7875	0.5812	[illegible]	+
δ Tauri	4	0.50	10.0	17 16.3	5 0 42.5	− 0 39.8	−1.0730	0.5814	[illegible]	−3
63 Tauri	6	0.50	10.1	16 30.4	0 55.7	− 1 58.4	−0.2600	0.5816	[illegible]	+
δ^2 Tauri	5½	−0.50	−10.1	+17 10.6	1 12.3	− 0 11.1	−0.9264	0.5817	[illegible]	−
70 Tauri	6	0.49	10.3	15 40.6	1 52.9	+ 0 25.0	+0.6552	0.5820	[illegible]	+
71 Tauri	6	0.49	10.3	15 21.4	2 11.8	+ 0 46.3	+1.0450	0.5820	[illegible]	+
75 Tauri	6	0.49	10.0	16 6.1	3 4.6	+ 1 37.1	+0.3545	0.5825	[illegible]	+
ε Tauri	4	0.49	10.3	15 42.4	3 8.1	+ 1 40.5	+0.7676	0.5825	[illegible]	+
θ^2 Tauri	4	−0.49	−10.3	+15 36.9	3 10.5	+ 1 42.9	+0.8656	0.5825	+0.0907	+
80 Tauri	6	0.48	10.3	15 23.1	3 48.6	+ 2 19.6	+1.1614	0.5829	0.0895	+
B. A. C. 1391	5	0.48	10.2	15 56.6	3 58.5	+ 2 29.1	+0.6[illegible]	0.5829	0.0893	+7
81 Tauri	6	0.48	10.3	15 26.5	4 1.3	+ 2 31.8	+1.1218	0.5829	0.0893	+
85 Tauri	6½	0.48	10.3	15 36.2	4 31.9	+ 3 1.3	+0.9[illegible]3	0.5834	0.0881	+
α Tauri	1	−0.46	−10.2	+16 16.6	6 14.3	+ 4 39.9	+0.452[illegible]	0.5838	+0.0858	+
σ^1 Tauri	5	−0.47	−10.4	+15 41.3	7 39.8	+ 6 2.3	+1.1730	0.5845	+0.0858	+

ELEMENTS FOR THE PREDICTION OF OCCULTATIONS.

JUNE.

THE STAR'S

Name.	Mag.	Red'ns to 1886.0. Δα	
		s	
ε Geminorum	6	−0.13	−
3 Cancri	6	0.06	
5 Cancri	6	0.08	
ω Cancri	4½	−0.04	
d² Cancri	6	0.00	
54 Cancri	6	+0.12	−
σ¹ Cancri	5½	0.14	
σ² Cancri	6	0.13	
π¹ Cancri	6	0.19	
π² Cancri	6	0.21	
18 Leonis	6	+0.38	−
A Leonis	4½	0.49	
44 Leonis	6	0.56	
45 Leonis	6	0.60	
ρ Leonis	4	0.62	
49 Leonis	6	+0.64	−
37 Sextantis	6	0.71	
56 Leonis	6½	0.77	
c Leonis	5	0.80	
χ Leonis	5	0.81	
σ Leonis	4	+0.91	−
Mars			
89 Leonis	6	1.01	
Jupiter			
10 Virginis	6½	1.22	
13 Virginis	6	+1.30	−
η Virginis	4	1.30	
Uranus			
γ Virginis	3	1.42	
38 Virginis	6	1.40	
k Virginis	6	+1.55	−
46 Virginis	6	1.57	
48 Virginis	6½	1.57	
θ Virginis	4½	[illegible]	
65 Virginis	6	1.66	
66 Virginis	6	+1.69	−
ι¹ Virginis	6½	1.74	
ι² Virginis	5	1.75	
80 Virginis	6	1.75	
88 Virginis	6½	1.84	
B.A.C.4647 mult.	6½	+1.89	−
94 Virginis	6½	1.95	
95 Virginis	6	1.96	
κ Virginis	4	2.00	
ξ¹ Libræ	[illegible]	2.21	
ξ² Libræ	5½	+2.20	−
19 Libræ	6	2.20	
γ Libræ	4½	2.41	−
η Libræ	6	2.44	+
49 Libræ	6	2.49	
φ Ophiuchi	4½	+2.56	+
24 Scorpii	5½	2.60	
29 Ophiuchi	6½	2.64	
B. A. C. 6214	5½	2.59	1
Lalande 35497	6½	2.54	1
B. A. C. 6536	6	+2.52	+1
d Sagittarii	5	+2.50	+1

ELEMENTS FOR THE PREDICTION OF OCCULTATIONS.

JULY.

The Stars.					At Conjunction in R. A.					
Name	Mag.	Red. to from 1886.0 Δα	Red. to from 1886.0 Δδ	Apparent Declination	Washington Mean Time	Hour Angle H	Y	x′	y′	N
		s	″	° ′	d h m	h m				
Lalande 46022	6	+2.67	+17.7	−14 55.1	16 21 44.0	+ 8 33.0	−0.2224	0.5400	+0.1067	−
9 Aquarii	6½	2.66	17.7	13 58.3	22 57.2	+ 9 43.9	−1.3914	0.5386	0.1081	−
18 Aquarii	5½	2.59	18.1	13 21.7	17 10 28.9	− 3 5.6	−0.5526	0.5357	0.1216	−
ι Capricorni	5½	2.51	18.1	11 53.2	21 49.9	+ 7 54.8	−0.7437	0.5320	0.1382	−
σ Aquarii	5½	2.41	18.1	12 7.2	18 10 12.0	− 4 5.2	+1.2236	0.5282	0.1441	−
B.A.C. 7774	6½	+2.40	+17.7	− 9 36.2	13 27.9	− 0 55.0	−1.0879	0.5270	+0.1471	−
67 Aquarii	6½	2.39	17.2	7 33.3	19 3 13.3	−11 33.8	−1.2821	0.5242	0.1560	−
λ Aquarii	4	2.25	17.1	8 10.9	8 8.6	− 6 47.1	+0.2871	0.5231	0.1680	+
78 Aquarii	6½	2.24	17.0	7 48.3	9 10.4	− 5 47.2	−0.0462	0.5229	0.1665	+
81 Aquarii	6½	2.23	16.9	7 40.1	12 46.3	− 2 17.5	+0.3845	0.5219	0.1657	+
82 Aquarii	6½	+2.22	+16.7	− 7 10.9	13 22.9	− 1 42.0	−0.0536	0.5219	+0.1658	+
φ Aquarii	4	2.18	16.4	6 39.5	19 36.2	+ 4 20.6	+0.3880	0.5212	0.1662	+
96 Aquarii	5½	2.16	16.2	5 44.6	22 17.2	+ 6 57.0	−0.1791	0.5208	0.1673	+
B.A.C. 8184	6	2.12	15.6	5 9.0	20 3 39.5	−11 50.0	+0.0683	0.5202	0.1677	+
20 Piscium	5½	2.03	14.5	3 23.5	13 26.3	− 2 19.9	−0.2008	0.5200	0.1730	+
24 Piscium	6	+2.01	+14.5	− 3 47.1	16 5.1	+ 0 14.3	+0.6223	0.5199	+0.1737	+
B.A.C. 5	5½	1.93	13.7	2 51.3	21 0 27.9	+ 8 22.6	+1.1282	0.5199	0.1755	+
10 Ceti	6	1.88	12.3	− 0 40.6	9 56.2	− 6 25.4	−0.3941	0.5206	0.1765	+
B.A.C. 237	6½	1.78	10.0	+ 2 46.2	22 54.1	+ 6 9.9	−1.0967	0.5229	0.1765	−
f Piscium	5	1.66	8.9	3 1.0	22 12 40.2	− 4 28.2	+1.0510	0.5264	0.1743	+
μ Piscium	5	+1.63	+ 7.5	+ 5 33.4	18 59.3	+ 1 39.7	−0.6173	0.5283	+0.1724	+
ν Piscium	4½	1.57	7.3	4 54.8	23 0 44.6	+ 7 14.7	+1.0668	0.5307	0.1704	+
64 Ceti	5½	1.45	4.6	8 2.3	15 42.4	− 2 15.0	+0.1881	0.5373	0.1630	+
ξ¹ Ceti	4	1.45	4.3	8 18.8	16 30.5	− 1 28.3	+0.0215	0.5380	0.1625	+
ξ Arietis	5	1.43	3.2	10 5.7	22 17.1	+ 4 7.5	−0.9585	0.5405	0.1591	−
B.A.C. 755	6½	+1.41	+ 3.1	+10 3.2	23 14.0	+ 5 2.6	−0.7634	0.5411	+0.1584	−
85 Ceti	6	1.34	2.2	10 15.3	24 6 50.0	−11 35.9	+0.2025	0.5454	0.1525	+
μ Ceti	4	1.31	2.2	9 38.0	8 0.1	−10 28.0	+1.0435	0.5462	0.1517	+
Lalande 5725	6	1.24	+ 0.2	12 45.1	18 7.1	− 0 40.7	−0.7778	0.5522	0.1427	−
f Tauri	4	1.11	− 1.1	12 32.7	25 5 24.9	+10 14.5	+0.9822	0.5602	0.1302	+
48 Tauri	6	+0.93	− 3.7	+15 6.9	26 1 19.5	+ 5 27.7	+0.6375	0.5737	+0.1045	+
γ Tauri	4	0.91	4.0	15 21.1	3 3.7	+ 7 8.1	+0.5696	0.5751	0.1019	+
58 Tauri	6	0.90	3.9	14 49.2	3 25.2	+ 7 28.8	+1.1558	0.5758	0.1008	+
63 Tauri	6	0.91	4.4	16 30.5	4 36.3	+ 8 37.4	−0.4724	0.5765	0.0991	+
δ² Tauri	5½	0.91	4.6	17 10.7	4 53.0	+ 8 53.5	−1.1376	0.5767	0.0990	−
70 Tauri	6	+0.88	− 4.3	+15 40.7	5 34.0	+ 9 33.1	+0.4807	0.5772	+0.0977	+
71 Tauri	6	0.88	4.3	15 21.5	5 53.1	+ 9 51.4	+0.8424	0.5773	0.0973	+
75 Tauri	6	0.91	5.2	16 6.2	6 46.4	+10 42.9	+0.1584	0.5781	0.0959	+
θ¹ Tauri	4	0.87	4.5	15 42.5	6 50.0	+10 46.3	+0.5715	0.5781	0.0959	+
θ² Tauri	4	0.87	4.5	15 37.0	6 52.4	+10 48.6	+0.6712	0.5781	0.0959	+
80 Tauri	6	+0.87	− 4.5	+15 23.2	7 30.7	+11 25.5	+0.9687	0.5785	+0.0946	+
B.A.C. 1391	5	0.87	4.6	15 56.7	7 40.7	+11 35.1	+0.4078	0.5786	0.0946	+
81 Tauri	6	0.86	4.5	15 26.6	7 43.6	+11 37.9	+0.9305	0.5786	0.0944	+
85 Tauri	6½	0.86	4.6	15 36.3	8 14.6	−11 52.2	+0.8117	0.5786	0.0939	+
α Tauri	1	0.85	4.9	16 16.7	9 57.7	−10 12.8	+0.2749	0.5802	0.0909	+
σ¹ Tauri	5	+0.82	− 4.8	+15 34.4	11 20.9	− 8 52.7	+1.1241	0.5808	+0.0889	+
σ² Tauri	5	0.82	4.9	15 41.4	11 23.5	− 8 50.2	+1.0090	0.5810	0.0882	+
B.A.C. 1526	5	0.76	5.7	16 58.4	18 58.8	− 1 31.6	+0.3107	0.5863	0.0765	+
m Tauri	5	0.73	6.4	18 29.4	23 5.9	+ 2 26.2	−0.9450	0.5891	0.0685	−
111 Tauri	5½	0.65	6.7	17 16.5	27 6 6.0	+ 9 10.4	+0.7269	0.5933	0.0552	+
115 Tauri	6	+0.64	− 6.9	+17 51.8	7 13.0	+10 14.9	+0.1879	0.5939	+0.0533	+
117 Tauri	6	0.63	6.8	17 8.6	7 34.6	+10 35.7	+0.9380	0.5943	0.0520	+
119 Tauri	5	0.62	7.3	18 30.4	9 15.0	−11 47.7	−0.3619	0.5951	0.0492	+
B.A.C. 1728	6	0.61	6.9	16 58.2	9 17.5	−11 45.3	+1.1989	0.5951	0.0492	+
120 Tauri	6	0.61	7.2	18 27.4	9 46.9	−11 17.2	−0.2841	0.5957	0.0478	+
127 Tauri	6	+0.58	− 7.5	+18 55.3	13 32.8	− 7 39.9	−0.5885	0.5979	+0.0401	+
130 Tauri	6	+0.56	− 7.4	+17 41.1	15 23.5	− 5 53.5	+0.7343	0.5991	+0.0362	+

ELEMENTS FOR THE PREDICTION OF OCCULTATIONS.

JULY.

THE STARS					AT CONJUNCTION IN R. A.					Limiting Parallels	
Name.	Mag.	Reduction from 1886.0 Δα	Δδ	Apparent Declination	Washington Mean Time	Hour Angle H	[illegible]	[illegible]	[illegible]	N.	S.
		s	″	° ′	d h m	h m					
χ² Orionis	6	+0.51	−8.0	+1[illegible] 41.5	27 21 43.8	+0 11.[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
68 Orionis	6	0.48	8.1	19 48.8	28 1 7.0	+3 27.0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
71 Orionis	6	0.46	8.0	19 11.5	2 14.9	+4 32.3	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
96 Geminorum	5½	+0.34	−8.2	+17 45.3	13 2.8	−9 5.7	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
				NEW	MOON.						

AUGUST.

Name.	Mag.	Δα	Δδ	Apparent Declination	Washington Mean Time	Hour Angle H	[illegible]	[illegible]	[illegible]	N.	S.
44 Leonis	6	+0.26	−5.9	+9 21.7	1 4 12.3	+2 34.6	+0.6567	[illegible]	[illegible]	[illegible]	[illegible]
45 Leonis	6	+0.26	−5.7	+10 20.5	5 10.5	+3 30.7	0.4717	[illegible]	[illegible]	[illegible]	[illegible]
ρ Leonis	4	0.27	5.6	9 53.5	7 17.3	+5 32.6	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
49 Leonis	6	0.29	5.6	9 14.3	8 12.4	+6 25.6	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
56 Leonis	6½	0.36	5.4	6 47.6	16 52.6	9 13.8	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
e Leonis	5	0.37	5.2	6 42.8	18 50.5	7 20.3	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
χ Leonis	5	+0.38	−4.8	+7 57.0	20 37.9	5 36.9	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
σ Leonis	4	0.43	4.5	6 39.1	2 3 23.3	+0 53.4	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
89 Leonis	6	0.50	4.6	3 41.5	9 0.2	+6 18.0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
10 Virginis	6½	0.66	3.5	+2 32.2	3 0 9.8	3 5.2	0.7150	[illegible]	[illegible]	[illegible]	[illegible]
JUPITER				−0 4.4	3 57.4	+0 31.3	+1.1170	[illegible]	[illegible]	[illegible]	[illegible]
13 Virginis	6	+0.73	−3.8	−0 9.3	4 3.9	+0 40.6	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
ν Virginis	4	0.75	3.7	0 2.1	4 36.5	+1 12.0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
γ Virginis	3	0.84	3.0	0 49.6	14 10.2	+10 25.5	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
38 Virginis	6	0.90	2.9	2 56.0	19 14.1	8 41.1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
k Virginis	6	0.94	2.8	3 11.9	22 5.5	5 55.8	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
46 Virginis	6	+0.94	−2.7	−2 45.3	22 30.5	5 31.7	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
48 Virginis	6½	0.96	2.6	3 3.0	23 58.8	4 6.5	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
65 Virginis	6	1.08	2.2	4 19.7	4 8 37.8	+4 14.6	0.0174	[illegible]	[illegible]	[illegible]	[illegible]
66 Virginis	6	1.09	2.2	4 31.1	9 10.5	+4 46.1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
l¹ Virginis	6½	1.14	2.3	5 52.8	11 44.4	+7 14.6	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
l² Virginis	5	+1.15	−2.2	−5 10.1	12 30.3	+7 50.0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
80 Virginis	6	1.16	1.8	4 48.9	14 6.2	+9 31.7	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
88 Virginis	6½	1.25	1.6	6 16.1	19 50.8	[illegible]	0.1177	[illegible]	[illegible]	[illegible]	[illegible]
B.A.C. 4647 mult.	6½	1.31	1.6	7 [illegible]	21 51.2	6 1.[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
94 Virginis	6½	1.38	1.3	8 [illegible]	5 3 57.4	1 5.5	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
95 Virginis	6	+1.[illegible]	−1.4	−8 46.2	4 [illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
ξ¹ Libræ	6	[illegible]	[illegible]	11 [illegible]	6 1 46.5	4 [illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
ξ² Libræ	5½	1.71	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
19 Libræ	6	1.7[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
B.A.C. 5070	6	[illegible]	[illegible]	11 [illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
γ Libræ	4½	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
η Libræ	[illegible]	[illegible]	[illegible]	[illegible]	7 [illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
48 Libræ	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
W. [illegible] xv. [illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
o Ophiuchi	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
24 Scorpii	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
B.A.C. [illegible]	[illegible]	[illegible]	[illegible]	[illegible]	10 [illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Lalande [illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
B.A.C. [illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
d Sagittarii	[illegible]	[illegible]	[illegible]	[illegible]	11 [illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible] Sagittarii	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible] Sagittarii	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
B.A.C. [illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
B.A.C. [illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
B.A.C. [illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible] Capricorni	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible] Capricorni	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

ELEMENTS FOR THE PREDICTION OF OCCULTATIONS.

AUGUST.

The Star's					At Conjunction in R. A.					Limiting Parallels.	
Name.	Mag.	Red'ns from 1886.0. Δα	Red'ns from 1886.0. Δδ	Apparent Declination	Washington Mean Time.	Hour Angle H	Y	x'	y'	N.	S.
		s	"	° ′	d h m	h m					
Lalande 40552	6	+2.95	+18.9	−14 55.1	13 3 56.7	− 7 26.8	−0.2828	0.5395	+0.1053	+11	−52
18 Aquarii	5½	2.91	19.6	13 21.7	16 42.8	+ 4 55.8	−0.5682	0.5359	0.1205	− 3	−74
λ Capricorni	5½	2.89	20.0	11 53.2	14 4 4.0	− 8 3.6	−0.7723	0.5327	0.1320	−14	−90
e^2 Aquarii	5½	2.85	20.2	12 7.2	16 25.6	+ 3 55.8	+1.1932	0.5296	0.1438	+75	+42
B. A. C. 7774	6½	2.84	20.2	9 36.2	19 41.3	+ 7 5.8	−1.1321	0.5285	0.1464	−38	−96
λ Aquarii	4	+2.76	+19.8	− 8 10.9	15 14 20.1	+ 1 11.9	+0.1463	0.5248	+0.1595	+41	−27
78 Aquarii	6½	2.76	19.7	7 48.3	15 22.0	+ 2 12.0	−0.1092	0.5246	0.1601	+27	−41
81 Aquarii	6½	2.74	19.7	7 40.1	18 57.4	+ 5 41.2	+0.3185	0.5240	0.1622	+52	−17
82 Aquarii	6½	2.74	19.7	7 10.9	19 33.8	+ 6 16.5	−0.1222	0.5237	0.1628	+26	−42
φ Aquarii	4	2.71	19.4	6 39.5	16 1 46.6	−11 41.6	+0.3164	0.5229	0.1659	+52	−17
96 Aquarii	5½	+2.69	+19.3	− 5 44.6	4 27.2	− 9 5.5	−0.2534	0.5224	+0.1672	+20	−50
B. A. C. 8184	6	2.67	19.0	5 9.0	9 49.4	− 3 52.6	−0.0092	0.5218	0.1693	+33	−35
20 Piscium	5½	2.63	18.3	3 23.4	19 35.7	+ 5 36.9	−0.2863	0.5212	0.1727	+19	−52
24 Piscium	6	2.62	18.2	3 47.0	22 14.6	+ 8 11.2	+0.6073	0.5212	0.1734	+76	− 2
29 Piscium	5	2.59	17.9	3 39.4	17 2 58.3	−11 13.2	+1.2874	0.5207	0.1745	+87	+52
4 Ceti	6	+2.58	+17.6	− 3 10.7	6 6.5	− 8 10.4	+1.3053	0.5208	+0.1750	+87	+56
5 Ceti	6	2.58	17.6	3 4.7	6 21.6	− 7 55.7	+1.2385	0.5208	0.1751	+87	+45
B. A. C. 5	5½	2.57	17.5	2 51.2	6 37.8	− 7 40.0	+1.0378	0.5210	0.1751	+87	+26
10 Ceti	6	2.54	16.4	− 0 40.5	16 7.1	+ 1 33.0	+0.2962	0.5210	0.1761	+52	−19
B. A. C. 237	6½	2.48	14.7	+ 2 46.2	18 5 8.4	− 9 48.3	−1.2050	0.5225	0.1759	−41	−88
f Piscium	5	+2.38	+13.2	+ 3 1.1	19 0.5	+ 3 39.6	+0.9480	0.5248	+0.1736	+90	+20
μ Piscium	5	2.37	12.0	5 33.5	19 1 23.3	+ 9 51.2	−0.7328	0.5266	0.1715	− 6	−84
ν Piscium	4½	2.33	11.5	4 54.9	7 12.6	− 8 29.8	+0.9621	0.5280	0.1695	+90	+22
64 Ceti	5½	2.24	8.9	8 2.3	22 23.1	+ 6 13.3	+0.0778	0.5338	0.1618	+39	−28
ξ^1 Ceti	4	2.24	8.6	8 18.8	23 12.3	+ 7 1.1	−0.0886	0.5338	0.1614	+30	−38
ξ Arietis	5	+2.21	+ 7.4	+10 5.7	20 5 4.9	−11 17.1	−1.0782	0.5362	+0.1578	−31	−90
B. A. C. 755	6½	2.20	7.3	10 3.2	6 2.9	−10 21.0	−0.8812	0.5365	0.1569	−15	−80
85 Ceti	6	2.13	6.4	10 15.4	13 47.8	− 2 50.5	+0.0951	0.5403	0.1512	+40	−26
μ Ceti	4	2.10	6.4	9 38.1	14 59.4	− 1 41.1	+0.9458	0.5406	0.1502	+90	+23
Lalande 5725	6	2.06	4.2	12 45.2	21 1 20.3	+ 8 20.1	−0.8976	0.5458	0.1412	−17	−78
f Tauri	4	+1.94	+ 2.7	+12 32.7	12 55.3	− 4 27.4	+0.8919	0.5523	+0.1291	+90	+22
48 Tauri	6	1.75	− 0.7	15 7.0	22 9 24.1	− 8 39.9	+0.5500	0.5652	0.1027	+73	+ 5
γ Tauri	4	1.74	1.0	15 21.2	11 11.5	− 6 56.2	+0.4830	0.5658	0.1006	+67	+ 1
58 Tauri	6	1.72	0.9	14 49.3	11 33.8	− 6 34.8	+1.0775	0.5667	0.0997	+90	+40
63 Tauri	6	1.74	1.6	16 30.6	12 46.9	− 5 24.2	−0.5750	0.5669	0.0981	+ 2	−62
70 Tauri	6	+1.71	− 1.5	+15 40.8	13 46.4	− 4 26.7	+0.3930	0.5678	+0.0966	+60	− 3
71 Tauri	6	1.70	1.4	15 21.6	14 6.1	− 4 7.7	+0.7596	0.5679	0.0964	+90	+18
75 Tauri	6	1.70	1.7	16 6.3	15 1.1	− 3 14.6	+0.0663	0.5686	0.0950	+39	−21
θ^1 Tauri	4	1.69	1.6	15 42.6	15 4.8	− 3 11.1	+0.4871	0.5686	0.0950	+68	+ 2
θ^2 Tauri	4	1.69	1.6	15 37.1	15 7.3	− 3 8.7	+0.5864	0.5686	0.0948	+77	+ 8
80 Tauri	6	+1.67	− 1.7	+15 23.3	15 46.8	− 2 30.6	+0.8898	0.5692	+0.0937	+90	+29
B. A. C. 1391	5	1.68	1.9	15 56.8	15 57.2	− 2 20.5	+0.3210	0.5693	0.0935	+55	− 7
81 Tauri	6	1.67	1.7	15 26.7	16 0.1	− 2 17.7	+0.8496	0.5693	0.0935	+90	+23
85 Tauri	6½	1.67	1.8	15 36.4	16 31.9	− 1 47.0	+0.7306	0.5697	0.0922	+90	+16
α Tauri	1	1.66	2.2	16 16.8	18 18.3	− 0 4.4	+0.1864	0.5706	0.0900	+46	−14
σ^1 Tauri	5	+1.62	− 2.2	+15 34.5	19 44.1	+ 1 18.4	+1.0510	0.5715	+0.0896	+90	+39
σ^2 Tauri	5	1.62	2.3	15 41.5	19 46.9	+ 1 21.1	+0.9326	0.5715	0.0875	+90	+30
B. A. C. 1526	5	1.54	3.5	16 58.4	23 3 36.4	+ 8 53.8	+0.2302	0.5765	0.0746	+49	−10
m Tauri	5	1.51	4.5	18 29.4	7 51.5	−11 0.3	−1.0392	0.5793	0.0675	−31	−72
111 Tauri	5½	1.40	4.7	17 16.5	15 5.0	− 4 2.7	+0.6582	0.5833	0.0548	+87	+16
115 Tauri	6	+1.39	− 5.1	+17 51.8	16 14.1	− 2 56.1	+0.1133	0.5838	+0.0531	+42	−14
117 Tauri	6	1.38	4.9	17 8.6	16 36.5	− 2 34.5	+0.8738	0.5845	0.0517	+90	+31
119 Tauri	5	1.37	5.5	18 30.4	18 20.1	− 0 54.8	−0.4423	0.5849	0.0490	+ 5	−47
B. A. C. 1728	6	1.35	5.0	16 58.2	18 22.5	− 0 52.5	+1.1400	0.5856	0.0482	+90	+51
120 Tauri	6	1.36	5.6	18 27.4	18 53.0	− 0 23.2	−0.3634	0.5857	0.0476	+14	−42
122 Tauri	6	+1.33	− 5.1	+16 58.0	20 22.8	+ 1 3.3	+1.2362	0.5866	+0.0445	+90	+63
127 Tauri	6	+1.34	− 6.0	+18 55.3	22 45.9	+ 3 21.1	−0.6683	0.5878	+0.0403	− 4	−60

OCCULTATIONS VISIBLE AT WASHINGTON DURING THE YEAR 1886.

Date.	The Star's Name.	Mag.	Immersion. Washington. Sidereal Time.	Immersion. Washington. Mean Time.	Immersion. Angle from North Point.	Immersion. Angle from Vertex.	Emersion. Washington. Sidereal Time.	Emersion. Washington. Mean Time.	Emersion. Angle from North Point.	Emersion. Angle from Vertex.	Duration of Occultation.
			h m	h m	°	°	h m	h m	°	°	h m
May 13	Uranus		15 21	11 54	179	138	15 50	12 22	228	184	0 29
15	95 Virginis	6	13 49	10 14	25	28	Star 0'.4	north of	☽'s	limb.	
15	κ Virginis	4	17 36	14 0	126	84	18 38	15 2	266	219	1 2
17	49 Libræ	6	17 2	13 19	116	100	18 22	14 38	267	235	1 19
21	B. A. C. 6710	6	19 0	15 1	48	55	20 19	16 20	292	281	1 19
25	λ Aquarii	4	21 3	16 47	45	71	22 29	18 13	264	268	1 25
	NEW MOON.										
June 9	Jupiter		8 9	2 57	23	69	♃ 7'.2	north of	☽'s	limb.	
10	k Virginis	6	15 25	10 7	24	348	Star 8'.2	north of	☽'s	limb.	
13	γ Libræ	4½	14 2	8 32	29	50	Star 0'.5	north of	☽'s	limb.	
13	η Libræ	6	19 23	13 53	112	70	20 29	14 59	265	217	1 6
14	24 Scorpii	5½	21 36	16 2	66	18	22 30	16 56	299	249	0 54
17	B. A. C. 6536	6	14 17	8 32	184	231	Star 1'.5	south of	☽'s	limb.	
17	d Sagittarii	5	19 38	13 52	84	78	21 6	15 20	256	231	1 2
22	φ Aquarii	4	17 26	11 21	352	42	17 35	11 30	336	26	0
28	48 Tauri †	6	20 38	14 8	100	145	21 28	14 58	250	300	0 5
28	γ Tauri	4	22 13	15 43	74	126	23 10	16 41	254	308	0 5
	NEW MOON.										
July 5	56 Leonis	6½	16 2	9 6	110	58	16 57	10 1	289	238	0 5
6	β Virginis	3½	15 48	8 48	110	63	16 52	9 52	293	239	1
14	Lalande 35497	6½	22 21	14 49	122	83	23 14	15 41	217	172	0 5
20	24 Piscium	6	23 22	15 26	69	76	0 52	16 55	233	215	1 2
22	f Piscium †	5	18 44	10 41	106	157	19 32	11 28	214	265	0 4
27	130 Tauri †	6	22 7	13 44	87	131	22 56	14 32	256	306	0 4
	NEW MOON.										
Aug. 3	Jupiter		13 30	4 41	205	183	♃ 8'.0	south of	☽'s	limb.	
11	B. A. C. 6710	6	22 9	12 47	34	2	23 6	13 44	299	258	0 5
17	10 Ceti	6	2 25	16 39	28	355	3 31	17 44	281	238	1
22	70 Tauri	6	22 39	12 33	345	38	Star 2'.6	north of	☽'s	limb.	
22	71 Tauri	6	22 20	12 14	86	138	23 17	13 11	243	297	0 5
22	θ¹ Tauri	4	23 33	13 27	42	96	0 26	14 20	285	339	0 5
22	θ² Tauri	4	23 28	13 22	63	117	0 33	14 26	263	317	1
22	80 Tauri	6	0 35	14 27	163	217	Star 0'.8	south of	☽'s	limb.	
22	B. A. C. 1391	5	0 51	14 44	13	66	1 28	15 22	311	2	0 3
22	81 Tauri	6	0 44	14 38	151	204	0 59	14 53	174	226	0 1
22	85 Tauri	6½	1 11	15 4	119	171	2 3	15 57	206	252	0 5
22	α Tauri	1	4 19	17 53	31	45	5 21	18 54	301	287	1
23	111 Tauri	5½	23 28	13 18	75	128	0 25	14 14	270	325	0 5
23	117 Tauri	6	1 32	15 21	168	223	Star 4'.1	south of	☽'s	limb.	
	NEW MOON.										
31	k Virginis *	6	18 51	8 11	96	45	19 41	9 1	298	250	0
Sept. 1	B.A.C.4617‡ *mult.*	6½	18 59	8 15	53	2	19 30	8 46	338	287	0
4	24 Scorpii ‡	5½	20 53	9 57	120	75	21 51	10 54	245	194	0
7	d Sagittarii	5	19 41	8 33	98	91	21 7	9 58	243	218	1
15	ν Piscium	4½	23 42	12 1	153	186	Star 0'.9	south of	☽'s	limb.	

NOTE.—The angles of position are counted from the north point and vertex of the moon's limb, toward the east.
* Whole occultation below the horizon of Washington.
† Immersion below the horizon of Washington.
‡ Emersion below the horizon of Washington.

OCCULTATIONS VISIBLE AT WASHINGTON DURING THE YEAR 1886.

Date.	The Star's Name.	The Star's Mag.	Immersion. Washington. Sidereal Time.	Immersion. Washington. Mean Time.	Immersion. Angle from North Point.	Immersion. Angle from Vertex.	Emersion. Washington. Sidereal Time.	Emersion. Washington. Mean Time.	Emersion. Angle from North Point.	Emersion. Angle from Vertex.	Duration of Occultation.
			h m	h m	°	°	h m	h m	°	°	h m
Sept. 18	48 Tauri	6	2 33	14 40	105	141	3 47	15 54	221	231	1 14
18	γ Tauri	4	5 20	17 27	116	87	6 28	18 35	220	174	1 8
22	5 Cancri	6	1 39	13 30	121	172	2 28	14 19	242	296	0 49
24	A Leonis	4½	5 40	17 23	194	246	Star 1′.7	south of	☽'s	limb	
	NEW MOON										
Oct. 4	Lalande 35497	6½	22 30	9 35	121	80	23 23	10 28	213	168	0 53
9	φ Aquarii ‡	4	4 43	15 28	54	3	5 39	16 24	266	216	0 56
10	24 Piscium	6	23 33	10 14	54	58	1 2	11 43	249	228	1 29
12	f Piscium †	5	18 32	5 6	95	145	19 24	5 58	226	277	0 52
16	B. A. C. 1526	5	5 13	15 30	96	85	6 36	16 53	247	206	1 23
19	f Geminorum	6	1 19	11 24	359	51	Star 3′.7	north of	☽'s	limb.	
21	18 Leonis	6	6 22	16 19	117	166	7 36	17 32	275	316	1 13
	NEW MOON.										
Nov. 1	B. A. C. 6707 *	6½	0 29	9 44	167	118	Star 0′.6	south of	☽'s	limb.	
7	10 Ceti	6	4 4	12 55	24	338	4 56	13 46	290	240	0 52
12	70 Tauri	6	21 45	6 17	65	115	22 40	7 11	264	317	0 54
12	71 Tauri	6	22 22	6 53	165	217	Star 3′.2	south of	☽'s	limb.	
12	75 Tauri	6	23 39	8 10	343	37	Star 0′.2	north of	☽'s	limb.	
12	θ¹ Tauri	4	23 2	7 33	101	154	23 57	8 29	216	270	0 55
12	θ² Tauri	4	23 11	7 42	128	182	23 47	8 18	199	253	0 36
12	B. A. C. 1391	5	0 0	8 31	80	134	1 9	9 40	245	297	1 9
12	a Tauri	1	3 9	11 40	95	129	4 29	13 0	234	234	1 20
13	115 Tauri	6	0 36	9 3	62	117	1 40	10 7	272	326	1 4
22	94 Virginis	6½	8 36	16 26	160	211	9 17	17 8	246	294	0 41
	NEW MOON.										
28	B. A. C. 6536	6	21 48	5 17	29	356	22 36	6 5	308	268	0 48
30	B. A. C. 7263	6	1 13	8 34	127	82	1 51	9 12	196	148	0 38
Dec. 4	27 Piscium	5	20 47	3 52	155	195	Star 0′.4	south of	☽'s	limb	
4	29 Piscium	5	22 49	5 54	95	112	0 4	7 9	206	204	1 15
4	4 Ceti	6	3 51	10 56	156	111	Star 9′.7	south of	☽'s	limb.	
4	5 Ceti	6	4 14	11 18	159	113	Star 9′.2	south of	☽'s	limb.	
6	ν Piscium	4½	4 52	11 49	158	113	Star 7′.2	south of	☽'s	limb.	
9	γ Tauri	4	8 25	15 9	174	120	Star 4′.5	south of	☽'s	limb.	
9	70 Tauri	6	10 40	17 24	134	83	11 19	18 3	221	172	0 39
13	3 Cancri	6	1 0	7 29	64	114	1 47	8 16	298	350	0 47
18	46 Virginis	6	11 53	18 1	129	146	13 11	19 19	288	283	1 18
19	88 Virginis	6½	8 32	14 37	58	108	9 6	15 11	348	36	0 34
	NEW MOON.										
29	e³ Aquarii	5½	23 43	5 10	335	313	Star 2′.9	north of	☽'s	limb.	
30	h¹ Aquarii ‡	5½	4 15	9 37	101	51	5 6	10 28	217	166	0 51

NOTE.—The angles of position are counted from the north point and vertex of the moon's limb, toward the east.
* Whole occultation below the horizon of Washington.
† Immersion below the horizon of Washington.
‡ Emersion below the horizon of Washington.

DOWNES'S

FOR COMP TING THE TIM

h	m	Lat. 72°			Lat. [illegible]		
		z			z		
		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
0	0	0	0	0	0	0	0
	10	4	2	2	2	2	2
	20	[illegible]	[illegible]	4	4	[illegible]	[illegible]
	30	[illegible]	[illegible]	[illegible]	[illegible]	7	[illegible]
	40	[illegible]	7	[illegible]	[illegible]	[illegible]	11
	50	7	[illegible]	[illegible]	15	1[illegible]	1[illegible]
1	0	[illegible]	1[illegible]	11	12	14	16
	10	1[illegible]	12	1[illegible]	11	16	1[illegible]
	20	12	1[illegible]	15	16	1[illegible]	21
	30	13	15	17	1[illegible]	2[illegible]	2[illegible]
	40	14	16	1[illegible]	2[illegible]	22	2[illegible]
	50	15	1[illegible]	2[illegible]	21	24	2[illegible]
2	0	17	1[illegible]	22	2[illegible]	2[illegible]	3[illegible]
	10	1[illegible]	20	23	25	2[illegible]	32
	20	1[illegible]	22	24	2[illegible]	3[illegible]	34
	30	20	23	2[illegible]	2[illegible]	31	[illegible]
	40	21	24	27	2[illegible]	[illegible]	[illegible]
	50	22	25	2[illegible]	[illegible]	34	3[illegible]
3	0	23	2[illegible]	30	31	35	40
	10	24	27	31	33	36	42
	20	25	2[illegible]	32	34	3[illegible]	4[illegible]
	30	26	2[illegible]	33	35	3[illegible]	44
	40	26	2[illegible]	34	36	40	45
	50	27	30	34	36	41	46
4	0	2[illegible]	31	35	37	41	47
	10	2[illegible]	31	35	3[illegible]	42	47
	20	2[illegible]	32	3[illegible]	[illegible]	42	4[illegible]
	30	2[illegible]	32	3[illegible]	3[illegible]	43	4[illegible]
	40	2[illegible]	33	3[illegible]	3[illegible]	43	4[illegible]
	50	30	33	37	3[illegible]	44	4[illegible]
5	0	30	33	37	3[illegible]	44	4[illegible]
	10	30	33	[illegible]	[illegible]	44	4[illegible]
	20	30	33	37	40	44	4[illegible]
	30	30	33	37	4[illegible]	44	4[illegible]
	40	30	34	37	3[illegible]	44	4[illegible]
	50	30	33	37	3[illegible]	43	4[illegible]
6	0	30	33	37	3[illegible]	43	4[illegible]
	10	30	33	37	3[illegible]	43	47
	20	29	32	36	3[illegible]	42	47
	30	29	32	36	3[illegible]	42	46
	40	29	32	35	37	41	46
	50	2[illegible]	31	35	37	40	45
7	0	2[illegible]	31	34	36	40	44
	10	27	30	34	35	39	43
	20	27	30	33	35	3[illegible]	42
	30	26	29	32	34	37	41
	40	26	2[illegible]	31	33	36	40
	50	25	27	31	32	35	39
8	0	24	27	30	31	34	3[illegible]
	10	24	26	29	30	33	37
	20	23	25	2[illegible]	29	32	35
	30	22	24	27	2[illegible]	31	34
	40	21	23	26	27	30	33
	50	20	22	25	26	2[illegible]	31
9	0	19	21	24	25	27	30
	10	18	20	23	24	26	2[illegible]
	20	18	19	21	22	24	27
	30	16	1[illegible]	20	21	23	25
	40	15	17	19	20	22	24

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DOWNES'S TABLE GIVING VALUES OF τ.

FOR COMPUTING THE TIME AND HOUR-ANGLE OF APPARENT CONJUNCTION.

[illegible]

(Concluded from preceding page.)

[illegible]

SPN 86—30—1

FOR WASHINGTON MEAN NOON.

Date.	k	i	θ	L	Date.	k	i	θ	L
Jan. 1	0.434	97.6°	191.1°	48.9	July 0	0.743	60.9°	6.8°	41.6
6	0.586	80.1	187.5	45.2	5	0.660	71.3	11.3	37.1
11	0.693	67.3	183.6	38.9	10	0.582	80.6	15.2	34.3
16	0.767	57.8	179.3	33.5	15	0.505	89.4	18.6	32.6
21	0.825	49.4	174.7	29.9	20	0.427	98.4	21.6	31.3
26	0.869	42.5	169.8	27.6	25	0.343	108.3	24.5	29.6
31	0.903	36.2	164.7	26.5	30	0.252	119.7	27.9	26.4
Feb. 5	0.932	30.3	159.3	26.6	Aug. 4	0.156	133.5	32.7	20.1
10	0.957	23.9	153.2	27.1	9	0.068	149.7	42.0	10.6
15	0.978	17.1	145.0	30.4	14	0.015	166.1	77.1	2.6
20	0.996	7.4	127.4	34.8	19	0.027	161.0	164.5	5.0
25	0.998	5.5	40.6	41.3	24	0.122	139.1	186.8	21.2
Mar. 2	0.980	16.1	350.3	50.7	29	0.292	114.6	194.6	44.4
7	0.922	32.5	339.6	61.6	Sept. 3	0.505	89.4	199.8	63.4
12	0.801	53.0	335.1	69.8	8	0.712	64.9	204.9	70.1
17	0.619	76.3	332.5	68.4	13	0.866	43.0	209.8	64.3
22	0.411	100.3	330.4	55.0	18	0.958	24.1	215.8	53.6
27	0.224	123.5	327.7	35.1	23	0.991	11.0	227.5	43.2
Apr. 1	0.085	146.1	322.5	15.0	28	0.999	3.3	312.5	35.7
6	0.012	167.3	303.1	2.3	Oct. 3	0.992	10.2	12.0	30.6
11	0.009	169.0	178.9	1.7	8	0.978	17.3	19.8	27.5
16	0.062	151.1	158.8	10.0	13	0.956	23.8	22.1	25.9
21	0.140	135.2	154.3	19.0	18	0.933	29.9	22.4	25.5
26	0.236	121.8	152.5	26.4	23	0.903	36.3	21.8	26.1
May 1	0.326	110.4	151.8	30.4	28	0.865	43.0	20.4	27.9
6	0.411	100.3	151.7	32.6	Nov. 2	0.817	50.7	18.5	30.2
11	0.493	90.8	152.2	34.7	7	0.750	60.0	16.3	35.6
16	0.578	81.0	153.3	37.4	12	0.655	71.9	13.9	41.8
21	0.666	70.6	155.2	41.4	17	0.521	87.6	11.7	47.7
26	0.763	58.2	158.0	47.4	22	0.337	109.0	9.8	46.5
31	0.863	43.5	162.2	55.2	27	0.129	137.9	7.7	26.3
June 5	0.951	25.7	169.2	63.2	Dec. 2	0.004	173.1	348.7	0.9
10	0.997	6.1	196.7	67.4	7	0.074	148.5	203.7	17.1
15	0.982	15.2	342.1	64.5	12	0.285	115.4	199.9	47.0
20	0.917	33.4	354.2	56.5	17	0.490	91.1	197.1	53.2
25	0.832	48.4	1.2	48.2	22	0.642	73.5	193.8	47.2
30	0.743	60.9	6.8	41.6	27	0.755	59.3	190.0	40.1
					32	0.820	50.2	185.7	33.6

NOTATION.

k, the ratio of the illuminated portion of the apparent disk to the entire apparent disk con sidered as the superficies of a circle.

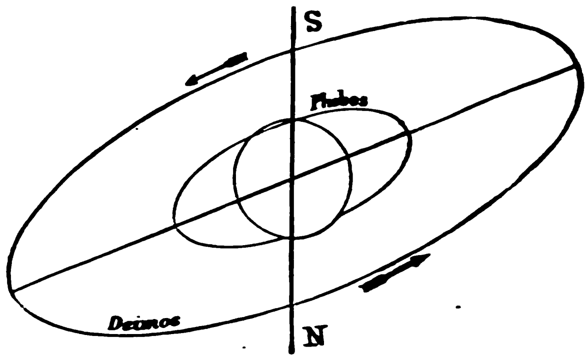
i, the angle between the sun and earth, as seen from the planet.

θ, the angle which the line joining the cusps, or extremities of the illuminated portion, makes with the meridian.

L, the brilliancy of the disk. The unit of L is the amount of light received by an eye from a circular disk with the same albedo as the planet, subtending an angular radius of one second of arc, situated at distance unity from the sun, and illuminated by the latter as the mean disk of the planet is illuminated.

FOR WASHINGTON MEAN NOON.

Date		k	i	θ	L	Date.		k	i	θ	L
			°	°					°	°	
Jan.	1	0.361	106.1	340.5	204.6	June	5	0.662	71.1	157.5	94.8
	6	0.324	110.6	339.1	213.3		10	0.681	68.8	158.7	90.5
	11	0.285	115.5	337.6	218.3		15	0.699	66.5	160.0	86.6
	16	0.243	121.0	335.9	217.9		20	0.717	64.3	161.6	83.0
	21	0.198	127.1	333.8	208.7		25	0.734	62.1	163.5	79.7
	23	0.180	129.8	332.9	200.8		30	0.750	59.9	165.5	76.8
	25	0.161	132.7	331.8	192.4	July	5	0.767	57.8	167.8	74.1
	27	0.143	135.6	330.5	181.4		10	0.782	55.7	170.2	71.7
	29	0.125	138.7	329.1	168.1		15	0.797	53.6	172.8	69.5
	31	0.106	141.9	327.3	151.7		20	0.811	51.5	175.5	67.5
Feb.	2	0.089	145.2	325.2	134.3		25	0.825	49.4	178.3	65.6
	4	0.073	148.7	322.6	115.1		30	0.839	47.3	181.2	63.9
	6	0.058	152.2	319.2	95.3	Aug.	4	0.852	45.2	184.1	62.4
	8	0.044	155.7	314.9	76.0		9	0.864	43.2	186.9	61.0
	10	0.032	159.2	308.8	57.8		14	0.876	41.2	189.8	59.7
	12	0.023	162.6	300.7	42.0		19	0.888	39.2	192.5	58.5
	14	0.016	165.4	289.8	29.7		24	0.898	37.2	195.2	57.4
	16	0.012	167.4	271.7	22.5		29	0.909	35.2	197.5	56.4
	18	0.011	168.1	250.9	20.1	Sept.	3	0.919	33.2	199.6	55.5
	20	0,012	167.3	230.3	22.7		8	0.928	31.2	201.9	54.6
	22	0.017	165.1	214.9	30.8		13	0.936	29.2	203.8	53.8
	24	0.024	162.2	202.6	42.9		18	0.944	27.3	205.3	53.1
	26	0.034	158.9	194.6	58.1		23	0.952	25.4	206.7	52.4
	28	0.045	155.4	188.8	75.4		28	0.959	23.5	207.9	51.7
Mar.	2	0.059	152.0	184.6	93.7	Oct.	3	0.965	21.6	208.6	51.1
	7	0.098	143.4	177.5	137.6		8	0.971	19.7	209.4	50.6
	12	0.142	135.6	172.8	171.2		13	0.976	17.8	209.8	50.1
	17	0.188	128.6	169.8	191.9		18	0.981	15.9	209.9	49.7
	22	0.232	122.4	167.2	200.9		23	0.985	14.1	209.8	49.2
	27	0.275	116.8	165.1	201.6		28	0.989	12.3	209.3	48.8
Apr.	1	0.314	111.8	163.2	197.8	Nov.	2	0.992	10.5	208.6	48.5
	6	0.351	107.3	161.5	188.8		7	0.994	8.8	207.8	48.2
	11	0.386	103.2	160.0	179.2		12	0.996	7.0	206.9	48.0
	16	0.419	99.4	158.7	169.2		17	0.998	5.2	205.5	47.8
	21	0.449	95.9	157.6	166.4		22	0.999	3.6	204.4	47.6
	26	0.478	92.6	156.7	149.4		27	1.000	1.9	204.4	47.4
May	1	0.505	89.4	156.0	140.4	Dec.	2	1.000	0.2	232.1	47.3
	6	0.530	86.5	155.6	132.5		7	1.000	1.4	9.1	47.3
	11	0.555	83.7	155.3	124.3		12	0.999	3.1	9.5	47.3
	16	0.578	81.1	155.3	117.0		17	0.998	4.8	7.7	47.3
	21	0.600	78.5	155.5	110.7		22	0.996	6.5	5.4	47.4
	26	0.621	76.0	155.9	104.8		27	0.995	8.1	2.7	47.5
	31	0.642	73.5	156.6	99.6		32	0.993	9.7	0.1	47.7
	36	0.662	71.1	157.5	94.8		37	0.990	11.3	357.4	47.9



APPARENT ORBITS OF THE SATELLITES OF MARS IN FEBRUARY AND MARCH, 1886, AS SEEN IN AN INVERTING TELESCOPE.

The circle represents the disk of the planet, and is on the same scale as the orbits. The mean motions of the satellites are not yet (February, 1883) sufficiently well established to enable the times of greatest elongation to be very accurately predicted.

WASHINGTON MEAN TIMES OF ELONGATION.

PHOBOS.									DEIMOS.					
	d	h		d	h		d	h		d	h		d	h
Feb.	11	8.31 E.	Feb.	26	23.23 E.	Mar.	14	14.15 E.	Feb.	10	11.79 E.	Mar.	7	1.81 W.
	12	11.09 W.	Mar.	0	2.00 W.		15	16.93 W.		12	9.20 W.		8	23.17 E.
	13	13.87 E.		1	4.78 E.		16	19.71 E.		14	6.56 E.		10	20.58 W.
	14	16.65 W.		2	7.56 W.		17	22.49 W.		16	3.97 W.		12	17.94 E.
	15	19.43 E.		3	10.34 E.		19	1.27 E.		18	1.33 E.		14	15.35 W.
	16	22.21 W.		4	13.12 W.		20	4.05 W.		19	22.74 W.		16	12.71 E.
	18	0.99 E.		5	15.90 E.		21	6.83 E.		21	20.10 E.		18	10.12 W.
	19	3.77 W.		6	18.69 W.		22	9.61 W.		23	17.50 W.		20	7.48 E.
	20	6.55 E.		7	21.47 E.		23	12.39 E.		25	14.86 E.		22	4.89 W.
	21	9.33 W.		9	0.25 W.		24	15.17 W.		27	12.27 W.		24	2.25 E.
	22	12.11 E.		10	3.03 E.		25	17.95 E.	Mar.	1	9.63 E.		25	23.66 W.
	23	14.89 W.		11	5.81 W.		26	20.73 W.		3	7.04 W.		27	21.02 E.
	24	17.67 E.		12	8.59 E.		27	23.51 E.		5	4.40 E.		29	18.43 W.
	25	20.45 W.		13	11.37 W.		29	2.30 W.						

Date.			Position Angle.	Distance.	Date.			Position Angle.	Distance.
	d	h	°	"		d	h	°	"
Feb.	11	8.31	113.2	18.0	Feb.	10	11.79	111.4	45.5
Mar.	6	18.69	289.5	19.3	Mar.	7	1.81	288.9	45.3
	29	2.30	285.2	18.3		29	18.43	285.1	46.7

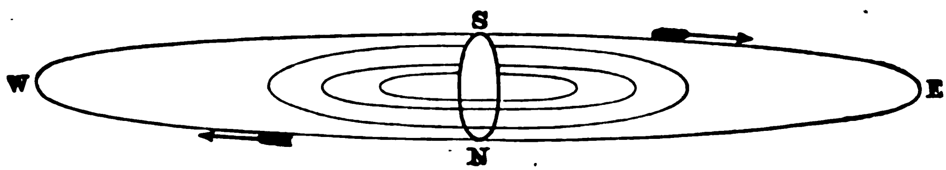
For Phobos every seventh eastern and western elongation is given, and for Deimos every third: the intermediate ones may be found with sufficient accuracy by adding the periodic time of each satellite.

Periodic time of Phobos, $0^d\ 7^h\ 39^m\ 13^s.937$. Periodic time of Deimos, $1^d\ 6^h\ 17^m\ 54^s.377$.

APPARENT DISK OF MARS.

January	15,	0.931	May	15,	0.901	September 15,	0.919
February	15,	0.983	June	15,	0.885	October 15,	0.936
March	15,	0.996	July	15,	0.888	November 15,	0.954
April	15,	0.943	August	15,	0.900	December 15,	0.969

The numbers in this table are the versed sines of the illuminated disk, the apperent diameter of the planet being taken as unity.



APPARENT ORBITS OF THE SATELLITES OF JUPITER IN 1886, AS SEEN IN AN INVERTING TELESCOPE.

(*The vertical scale is five times the horizontal one.*)

The object of this figure is to facilitate the identification of the satellites in cases where the diagrams of configurations do not suffice for that purpose: reference to the above diagram enables one to identify the inner and outer satellite of the pair. The central, vertical ellipse represents the disk of Jupiter, elongated five times in the vertical direction to correspond to the representation of the orbits of the satellites.

Facing each page of the phenomena of Jupiter's satellites, pages 456—476, is the page of diagrams of configurations, for the same month. The light disks ○ in the vertical row in the middle of the page represent the relative position of Jupiter each day. The dots adjacent in the same horizontal space represent the positions of the several satellites on the same day, at the hour and minute of Washington mean time indicated above the diagrams. The latitudes of the satellites are always considered zero in constructing the diagrams, except where two or more satellites chance to be at nearly the same distance from the planet, when they are placed one above the other according to their apparent latitudes. The numerals designating the satellites are placed on the right or left hand side of the dot, according as the motion of the satellite, for the time of the configuration, is toward the east or toward the west—the motion being always toward the numeral. Frequently, at the epoch of the configuration, one or more satellites will be invisible, being projected on the disk of the planet: this phenomenon is indicated by a light disk ○ at the left hand side of the page. Frequently, also, one or more satellites will be invisible, being concealed in occultation behind the disk, or eclipsed in the shadow of the planet: this phenomenon is indicated by a dark disk ● at the right hand side of the page. In both cases, the annexed numeral serves to point out which satellite is thus rendered invisible.

When an observation is made at a different hour from that for which the diagram is constructed, the motion of the satellite during the interval may be judged by transferring its given position to the above diagram, and estimating its motion during the elapsed interval on the above diagram of the orbits, by means of the following table of the periods:—

MEAN SYNODIC PERIODS OF THE SATELLITES.

	d	h	m	s		d
I.	1	18	28	35.945	=	1.76986048
II.	3	13	17	53.735	=	3.55409416
III.	7	3	59	35.854	=	7.16638720
IV.	16	18	5	6.928	=	16.75355241

WASHINGTON MEAN TIMES OF SUPERIOR GEOCENTRIC CONJUNCTION.

SATELLITE I.

		h m			h m			h m			h m
Jan.	0	5 18.3	Mar.	20	19 18.5	June	8	9 28.9	Aug.	27	1 3
	1	23 46.3		22	13 44.3		10	3 57.3		28	20 5
	3	18 14.2		24	8 10.1		11	22 25.8		30	14 3
	5	12 42.2		26	2 36.0		13	16 54.3	Sept.	1	9 5
	7	7 9.9		27	21 1.9		15	11 22.8		3	3 3
	9	1 37.7		29	15 27.9		17	5 51.5		4	22
	10	20 5.4		31	9 53.8		19	0 20.3		6	16 3
	12	14 33.0	Apr.	2	4 19.8		20	18 49.0		8	11
	14	9 0.5		3	22 45.8		22	13 17.9		10	5 3
	16	3 28.0		5	17 11.9		24	7 46.8			
	17	21 55.4		7	11 37.9		26	2 15.8			
	19	16 22.8		9	6 4.0		27	20 44.7			
	21	10 50.0		11	0 30.3		29	15 13.8			
	23	5 17.3		12	18 56.5	July	1	9 42.9	Nov.	7	16 1
	24	23 44.4		14	13 22.7		3	4 12.0		9	10 4
	26	18 11.3		16	7 49.0		4	22 41.2		11	5 1
	28	12 38.3		18	2 15.4		6	17 10.5		12	23 4
	30	7 5.1		19	20 41.9		8	11 39.8		14	18 1
Feb.	1	1 32.0		21	15 8.3		10	6 9.2		16	12 4
	2	19 58.8		23	9 34.8		12	0 38.6		18	7 1
	4	14 25.6		25	4 1.4		13	19 8.1		20	1 4
	6	8 52.2		26	22 28.1		15	13 37.5		21	20 1
	8	3 18.7		28	16 54.9		17	8 7.1		23	14 4
	9	21 45.3		30	11 21.7		19	2 36.6		25	9 1
	11	16 11.8	May	2	5 48.5		20	21 6.2		27	3 4
	13	10 38.2		4	0 15.5		22	15 35.8		28	22 17
	15	5 4.5		5	18 42.5		24	10 5.6		30	16 47
	16	23 30.8		7	13 9.5		26	4 35.2	Dec.	2	11 17
	18	17 57.1		9	7 36.6		27	23 5.0		4	5 46
	20	12 23.3		11	2 3.9		29	17 34.8		6	0 16
	22	6 49.4		12	20 31.2		31	12 4.6		7	18 46
	24	1 15.5		14	14 58.5	Aug.	2	6 34.4		9	13 16
	25	19 41.6		16	9 25.9		4	1 4.4		11	7 45
	27	14 7.7		18	3 53.4		5	19 34.2		13	2 15
Mar.	1	8 33.7		19	22 20.9		7	14 4.2		14	20 44
	3	2 59.7		21	16 48.6		9	8 34.0		16	15 14
	4	21 25.6		23	11 16.3		11	3 4.1		18	9 4
	6	15 51.6		25	5 44.1		12	21 34.0		20	4 1
	8	10 17.4		27	0 12.0		14	16 4.1		21	22 4
	10	4 43.3		28	18 39.9		16	10 34.1		23	17 1
	11	23 9.2		30	13 7.8		18	5 4.3		25	11 4
	13	17 35.0	June	1	7 36.0		19	23 34.3		27	6 1
	15	12 1.0		3	2 4.1		21	18 4.5		29	0 3
	17	6 26.8		4	20 32.3		23	12 34.7		30	19
	19	0 52.6		6	15 0.6		25	7 4.9		32	13 3

WASHINGTON MEAN TIMES OF SUPERIOR GEOCENTRIC CONJUNCTION.

SATELLITE II.

		h m			h m			h m			h m
Jan.	3	12 11.8	Mar.	26	3 20.5	June	15	19 6.1	Sept.	5	14 21.9
	7	1 27.4		29	16 28.9		19	8 24.2		9	3 45.5
	10	14 43.3	Apr.	2	5 36.5		22	21 43.2			
	14	3 57.9		5	18 45.4		26	11 2.1			
	17	17 12.8		9	7 53.5		30	0 21.9	Nov.	5	2 4.5
	21	6 26.3		12	21 3.0	July	3	13 41.5		8	15 27.7
	24	19 40.0		16	10 11.7		7	3 1.9		12	4 50.8
	28	8 52.2		19	23 21.9		10	16 22.2		15	18 13.7
	31	22 4.8		23	12 31.6		14	5 43.3		19	7 36.4
Feb.	4	11 16.0		27	1 42.6		17	19 4.3		22	20 58.9
	8	0 27.6		30	14 53.1		21	8 25.8		26	10 21.4
	11	13 37.8	May	4	4 5.2		24	21 47.3		29	23 43.6
	15	2 48.5		7	17 16.9		28	11 9.3	Dec.	3	13 5.6
	18	15 57.8		11	6 30.1	Aug.	1	0 31.4		7	2 27.3
	22	5 7.6		14	19 42.9		4	13 53.9		10	15 49.0
	25	18 16.1		18	8 57.2		8	3 16.4		14	5 10.2
Mar.	1	7 25.2		21	22 11.2		11	16 39.1		17	18 31.3
	4	20 33.1		25	11 26.5		15	6 2.0		21	7 52.0
	8	9 41.7		29	0 41.5		18	19 25.1		24	21 12.5
	11	22 49.2	June	1	13 57.7		22	8 48.3		28	10 32.6
	15	11 57.5		5	3 13.7		25	22 11.6		31	23 52.4
	19	1 4.8		8	16 29.8		29	11 34.9		35	13 12.5
	22	14 13.1		12	5 47.9	Sept.	2	0 58.3			

SATELLITE III.

		h m			h m			h m			h m
Jan.	4	19 44.6	Mar.	31	13 17.9	June	25	8 56.1	Nov.	8	19 36.6
	11	23 33.1	Apr.	7	16 36.3	July	2	13 1.0		16	0 0.9
	19	3 17.0		14	19 56.5		9	17 8.8		23	4 24.1
	26	6 56.2		21	23 19.6		16	21 20.0		30	8 45.8
Feb.	2	10 31.5		29	2 46.2		24	1 33.4	Dec.	7	13 5.5
	9	14 2.1	May	6	6 17.0		31	5 49.1		14	17 23.2
	16	17 29.1		13	9 52.8	Aug.	7	10 7.0		21	21 38.0
	23	20 51.8		20	13 32.7		14	14 27.0		29	1 49.9
Mar.	3	0 11.5		27	17 17.3		21	18 49.1		36	5 59.0
	10	3 28.9	June	3	21 5.8		28	23 12.9			
	17	6 45.0		11	0 58.5	Sept.	5	3 37.9			
	24	10 1.0		18	4 55.4		12	8 3.4			

SATELLITE IV.

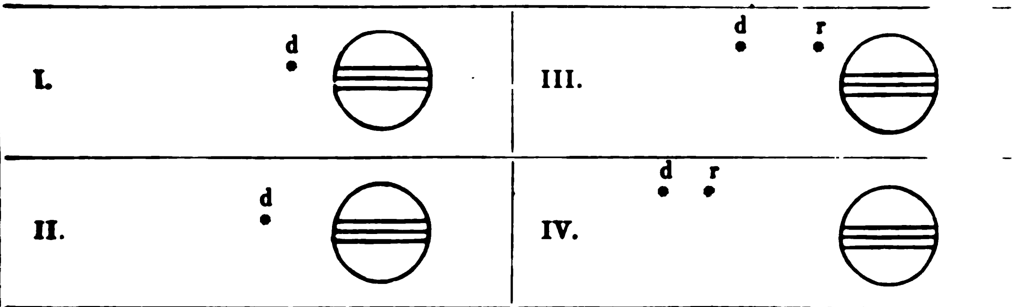
		h m			h m			h m			h m
Jan.	3	18 18.7	Apr.	13	13 11.2	July	22	19 47.4	Oct.	31	21 28.7
	20	11 14.9		30	4 8.5	Aug.	8	15 26.0	Nov.	17	17 51.9
Feb.	6	3 11.8	May	16	19 55.6		25	11 28.8	Dec.	4	13 57.0
	22	18 15.7	June	2	12 38.6	Sept.	11	7 49.6		21	9 36.4
Mar.	11	8 40.9		19	6 16.4					38	[4 42.1]
	27	22 50.3	July	6	0 41.6						

NOTE.—In. denotes ingress, Eg., egress, Dis., disappearance; Re., reappearance; Ec., eclipse.
Oc. denotes occultation; Tr., transit of the satellite, Sh., transit of the shadow, * Visible at Washington.

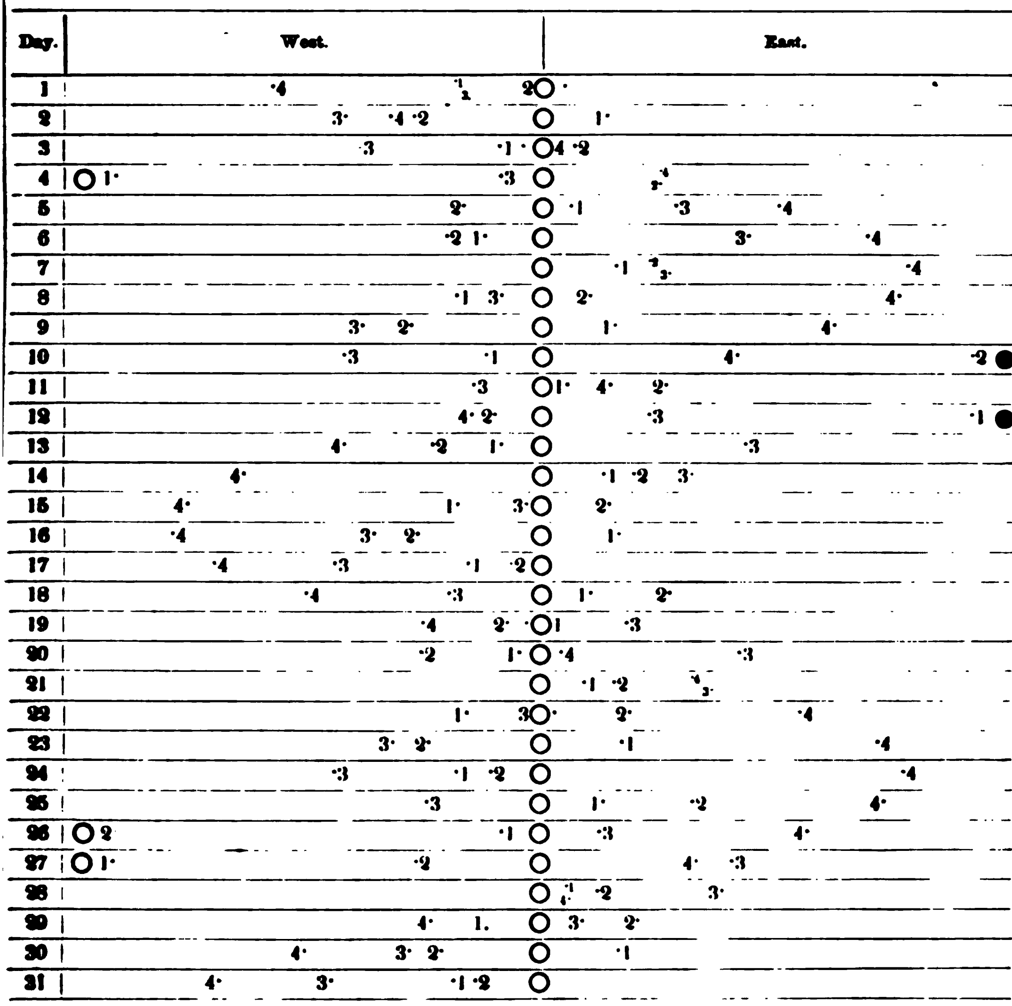
WASHINGTON MEAN TIME.

JANUARY.

Phases of the Eclipses of the Satellites for an Inverting Telescope.



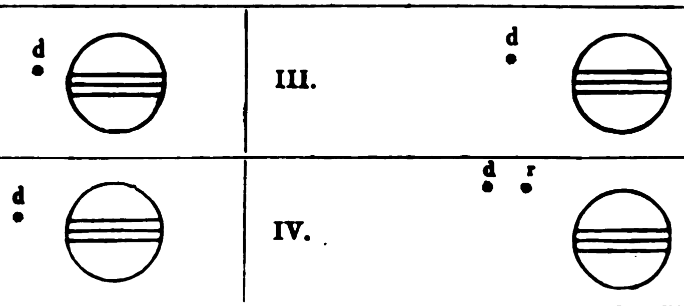
Configurations at $15^h\ 0^m$ *for an Inverting Telescope.*



WASHINGTON MEAN TIME.

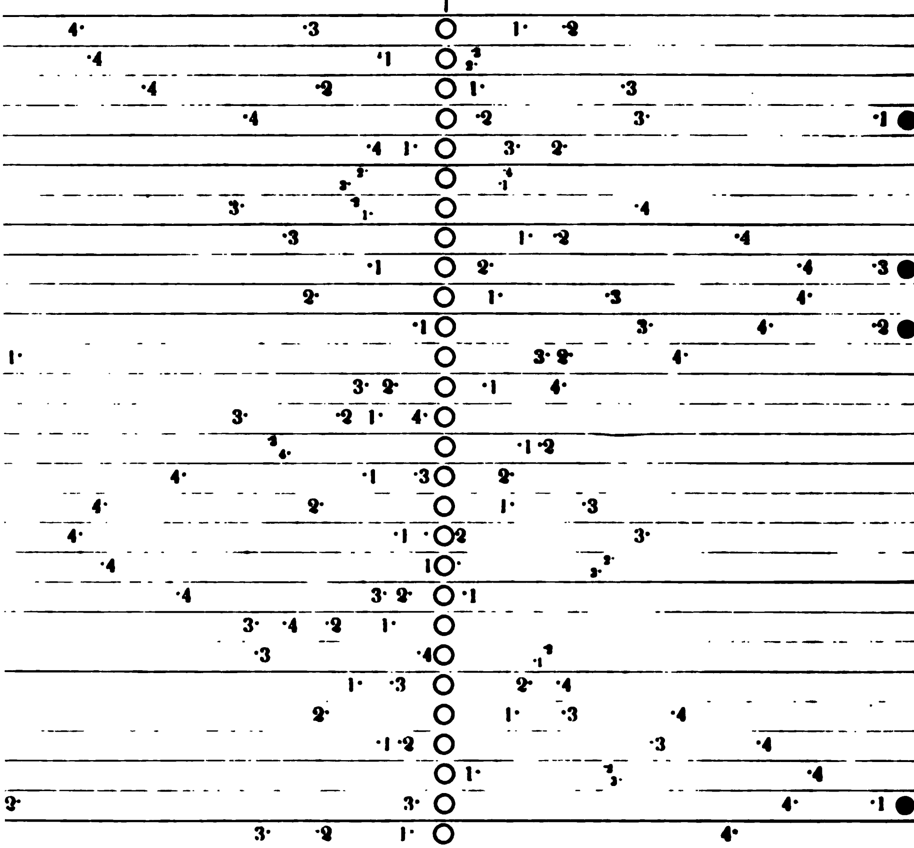
FEBRUARY.

Phases of the Eclipses of the Satellites for an Inverting Telescope.



Configurations at 14h 0m for an Inverting Telescope.

West.	East.

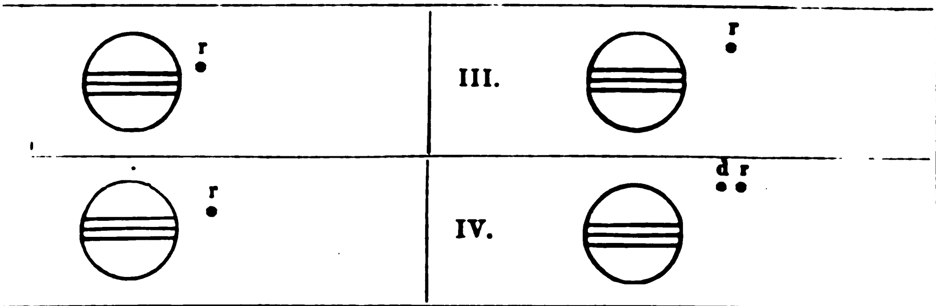


Oc. denotes occultation; Tr., transit of the satellite; Sh., transit of the shadow; *Visible at Wash

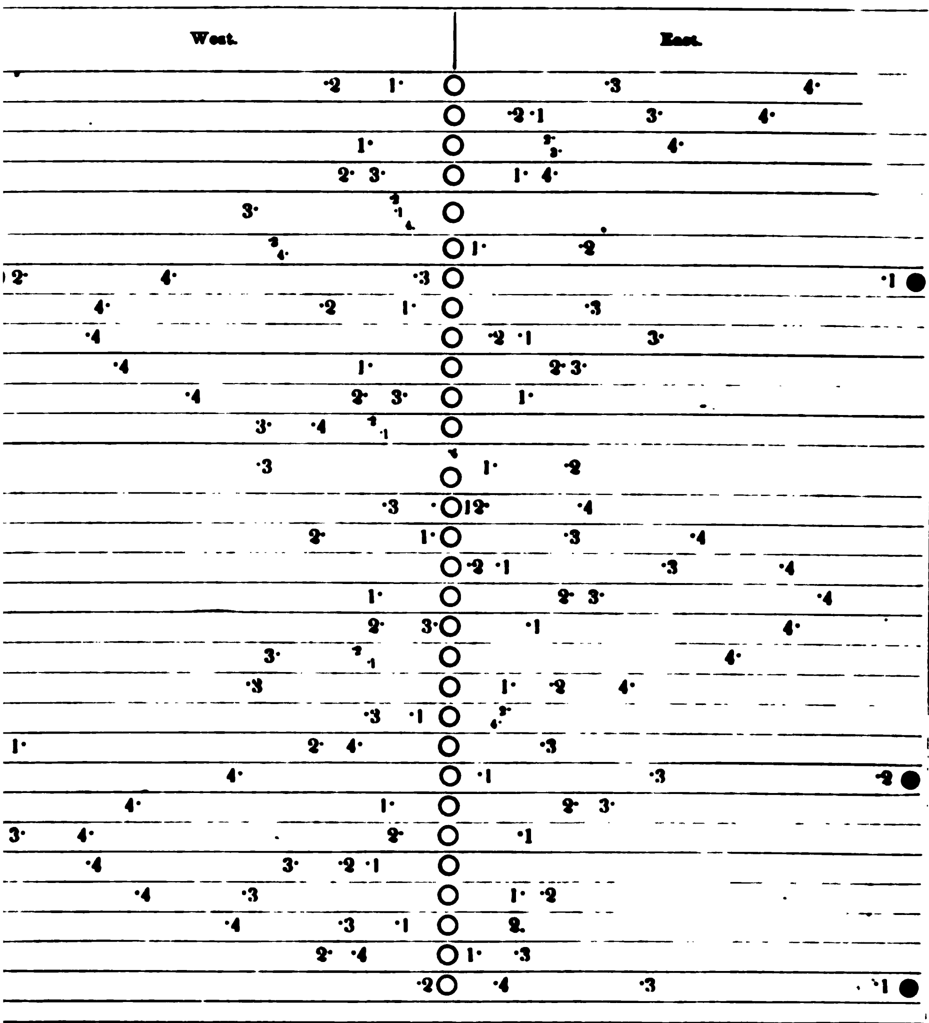
WASHINGTON MEAN TIME.

APRIL.

Phases of the Eclipses of the Satellites for an Inverting Telescope.



Configurations at 12h 0m for an Inverting Telescope.

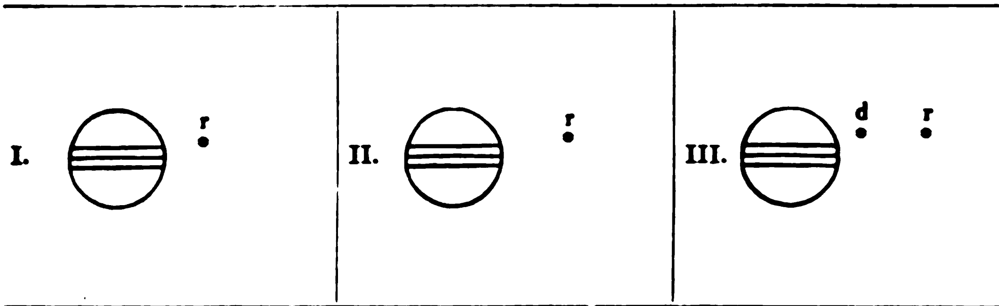


Note.—In. denotes ingress; Eg., egress; Dis., disappearance, Re., reappearance, Ec., eclipse.
Oc. denotes occultation Tr., transit of the satellite; Sh., transit of the shadow; * Visible at Washingt

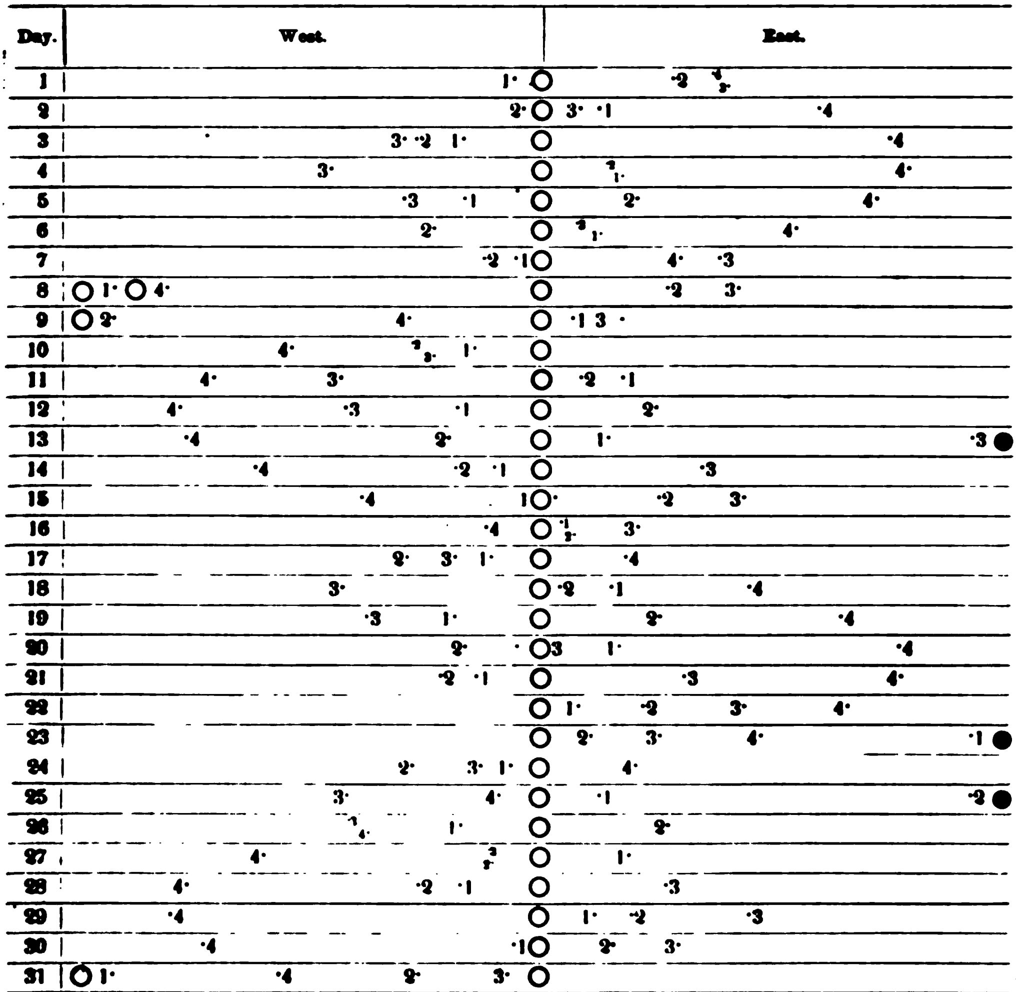
WASHINGTON MEAN TIME.

MAY.

Phases of the Eclipses of the Satellites for an Inverting Telescope.



Configurations at 11h 0m for an Inverting Telescope.



WASHINGTON MEAN TIME.

JUNE.

d	h	m	s			
1	6	28		I.	Oc.	Dis.
	9	54	37.7	I.*	Ec.	Re.
	12	33		II.*	Oc.	Dis.
	17	47	11.0	II.	Ec.	Re.
2	3	48		I.	Tr.	In.
	5	2		I.	Sh.	In.
	6	4		I.	Tr.	Eg.
	7	17		I.	Sh.	Eg.
	11	29		IV.*	Oc.	Dis.
	13	48		IV.	Oc.	Re.
3	0	56		I.	Oc.	Dis.
	4	23	17.0	I.	Ec.	Re.
	6	43		II.	Tr.	In.
	9	14		II.*	Sh.	In.
	9	32		II.*	Tr.	Eg.
	12	0		II.*	Sh.	Eg.
	19	34		III.	Oc.	Dis.
	22	16		I.	Tr.	In.
	22	38		III.	Oc.	Re.
	23	30		I.	Sh.	In.
4	0	32		I.	Tr.	Eg.
	0	47	24.6	III.	Ec.	Dis.
	1	45		I.	Sh.	Eg.
	3	24	23.8	III.	Ec.	Re.
	19	24		I.	Oc.	Dis.
	22	51	58.7	I.	Ec.	Re.
5	1	49		II.	Oc.	Dis.
	7	5	4.9	II.	Ec.	Re.
	16	44		I.	Tr.	In.
	17	59		I.	Sh.	In.
	19	0		I.	Tr.	Eg.
	20	14		I.	Sh.	Eg.
6	13	52		I.	Oc.	Dis.
	17	20	38.0	I.	Ec.	Re.
	19	59		II.	Tr.	In.
	22	32		II.	Sh.	In.
	22	48		II.	Tr.	Eg.
7	1	18		II.	Sh.	Eg.
	9	25		III.*	Tr.	In.
	11	13		I.*	Tr.	In.
	12	28		I.	Sh.	In.
	12	28		III.	Tr.	Eg.
	13	29		I.	Tr.	Eg.
	14	35		III.	Sh.	In.
	14	43		I.	Sh.	Eg.
	17	24		III.	Sh.	Eg.
8	8	21		I.*	Oc.	Dis.
	11	49	22.2	I.*	Ec.	Re.
	15	6		II.	Oc.	Dis.
	20	23	38.8	II.	Ec.	Re.
9	5	41		I.	Tr.	In.
	6	56		I.	Sh.	In.
	7	57		I.	Tr.	Eg.
	9	11		I.*	Sh.	Eg.
10	2	49		I.	Oc.	Dis.
	6	18	2.0	I.	Ec.	Re.
	9	16		II.*	Tr.	In.
	11	50		II.*	Sh.	In.
	12	5		II.	Tr.	Eg.
	14	35		II.	Sh.	Eg.
	18	25		IV.	Tr.	In.
	20	52		IV.	Tr.	Eg.
	23	26		III.	Oc.	Dis.
11	0	9		I.	Tr.	In.

d	h	m	s			
11	1	25		I.	Sh.	In.
	2	25		I.	Tr.	Eg.
	2	31		III.	Oc.	Re.
	3	40		I.	Sh.	Eg.
	4	46	31.1	III.	Ec.	Dis.
	7	22	22.1	III.	Ec.	Re.
	21	17		I.	Oc.	Dis.
12	0	46	44.5	I.	Ec.	Re.
	4	23		II.	Oc.	Dis.
	9	41	29.9	II.*	Ec.	Re.
	18	38		I.	Tr.	In.
	19	54		I.	Sh.	In.
	20	54		I.	Tr.	Eg.
	22	9		I.	Sh.	Eg.
13	15	46		I.	Oc.	Dis.
	19	15	24.2	I.	Ec.	Re.
	22	33		II.	Tr.	In.
14	1	8		II.	Sh.	In.
	1	22		II.	Tr.	Eg.
	3	53		II.	Sh.	Eg.
	13	6		I.	Tr.	In.
	13	20		III.	Tr.	In.
	14	22		I.	Sh.	In.
	15	22		I.	Tr.	Eg.
	16	24		III.	Tr.	Eg.
	16	37		I.	Sh.	Eg.
	18	35		III.	Sh.	In.
	21	22		III.	Sh.	Eg.
15	10	14		I.*	Oc.	Dis.
	13	44	9.0	I.	Ec.	Re.
	17	41		II.	Oc.	Dis.
	22	59	56.6	II.	Ec.	Re.
16	7	35		I.	Tr.	In.
	8	51		I.*	Sh.	In.
	9	51		I.*	Tr.	Eg.
	11	6		I.*	Sh.	Eg.
17	4	43		I.	Oc.	Dis.
	8	12	49.5	I.*	Ec.	Re.
	11	51		II.	Tr.	In.
	14	26		II.	Sh.	In.
	14	40		II.	Tr.	Eg.
	17	11		II.	Sh.	Eg.
18	2	4		I.	Tr.	In.
	3	20		I.	Sh.	In.
	3	23		III.	Oc.	Dis.
	4	20		I.	Tr.	Eg.
	5	35		I.	Sh.	Eg.
	6	28		III.	Oc.	Re.
	8	45	41.8	III.*	Ec.	Dis.
	11	20	24.4	III.*	Ec.	Re.
	23	12		I.	Oc.	Dis.
19	2	41	32.8	I.	Ec.	Re.
	5	1		IV.	Oc.	Dis.
	7	0		II.	Oc.	Dis.
	7	31		IV.	Oc.	Re.
	12	17	46.5	II.	Ec.	Re.
	20	32		I.	Tr.	In.
	21	49		I.	Sh.	In.
	22	49		I.	Tr.	Eg.
20	0	4		I.	Sh.	Eg.
	17	41		I.	Oc.	Dis.
	21	10	12.7	I.	Ec.	Re.
21	1	9		II.	Tr.	In.
	3	44		II.	Sh.	In.

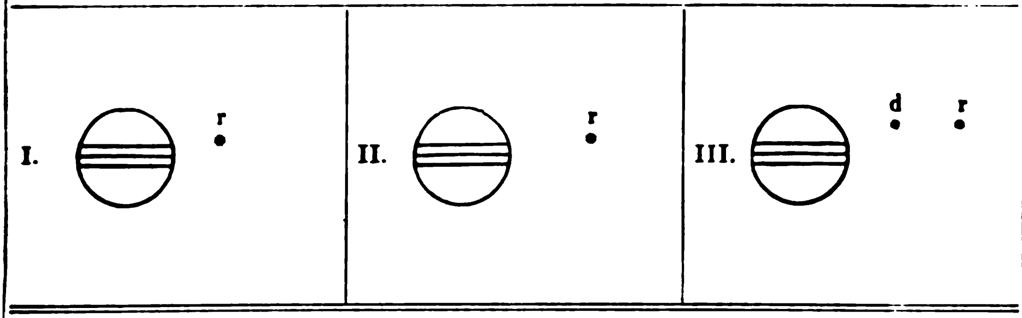
d	h	m	s			
21	3	58		II.	Tr.	Eg.
	6	29		II.	Sh.	Eg.
	15	1		I.	Tr.	In.
	16	18		I.	Sh.	In.
	17	18		I.	Tr.	Eg.
	17	19		III.	Tr.	In.
	18	33		I.	Sh.	Eg.
	20	24		III.	Tr.	Eg.
	22	35		III.	Sh.	In.
22	1	21		III.	Sh.	Eg.
	12	10		I.	Oc.	Dis.
	15	38	58.5	I.	Ec.	Re.
	20	19		II.	Oc.	Dis.
23	1	36	6.6	II.	Ec.	Re.
	9	30		I.*	Tr.	In.
	10	47		I.*	Sh.	In.
	11	47		I.	Tr.	Eg.
	13	2		I.	Sh.	Eg.
24	6	38		I.	Oc.	Dis.
	10	7	39.3	I.*	Ec.	Re.
	14	28		II.	Tr.	In.
	17	1		II.	Sh.	In.
	17	16		II.	Tr.	Eg.
	19	46		II.	Sh.	Eg.
25	3	59		I.	Tr.	In.
	5	15		I.	Sh.	In.
	6	16		I.	Tr.	Eg.
	7	24		III.	Oc.	Dis.
	7	30		I.	Sh.	Eg.
	10	28		III.*	Oc.	Re.
	12	45	1.1	III.	Ec.	Dis.
	15	18	35.5	III.	Ec.	Re.
26	1	7		I.	Oc.	Dis.
	4	36	23.1	I.	Ec.	Re.
	9	38		II.*	Oc.	Dis.
	14	53	53.5	II.	Ec.	Re.
	22	28		I.	Tr.	In.
	23	44		I.	Sh.	In.
27	0	45		I.	Tr.	Eg.
	1	59		I.	Sh.	Eg.
	12	24		IV.	Tr.	In.
	14	55		IV.	Tr.	Eg.
	19	36		I.	Oc.	Dis.
	23	5	3.3	I.	Ec.	Re.
28	3	47		II.	Tr.	In.
	6	19		II.	Sh.	In.
	6	35		II.	Tr.	Eg.
	9	4		II.*	Sh.	Eg.
	16	57		I.	Tr.	In.
	18	13		I.	Sh.	In.
	19	14		I.	Tr.	Eg.
	20	28		I.	Sh.	Eg.
	21	21		III.	Tr.	In.
29	0	26		III.	Tr.	Eg.
	2	34		III.	Sh.	In.
	5	19		III.	Sh.	Eg.
	14	5		I.	Oc.	Dis.
	17	33	49.4	I.	Ec.	Re.
	22	57		II.	Oc.	Dis.
30	4	12	6.4	II.	Ec.	Re.
	11	26		I.	Tr.	In.
	12	41		I.	Sh.	In.
	13	43		I.	Tr.	Eg.
	14	56		I.	Sh.	Eg.

NOTE.—In. denotes ingress; Eg., egress; Dis., disappearance; Re., reappearance; Ec., eclipse.
Oc. denotes occultation; Tr., transit of the satellite; Sh., transit of the shadow; * Visible at Washington.

WASHINGTON MEAN TIME.

JUNE.

Phases of the Eclipses of the Satellites for an Inverting Telescope.



Configurations at 10h 0m for an Inverting Telescope.

Day.	West.	East.
1	3· ·4 ·2	·1
2	·3 1· ·	4 ·2
3	O 2· ·3	·1 ·4
4	·2 ·1	·3 ·4
5		2 1· ·3 ·4
6	·1	2· 3· ·4
7	O 3· 2· 1	· 4·
8	3· ·2	4· ·1 ●
9	·3 1·	·2 4·
10	O 2· ·3	4· ·1
11	·2 1· 4·	·3
12	4·	·2 1· ·3
13	4· ·1	2· 3·
14	4· 2·	3· 1·
15	·4 3· ·2 ·	1
16	·4 ·3 1·	·2
17	·4 ·3	2· ·1
18	2· ·4 1·	·3
19		2 ·4 ·1 ·3
20	·1	2· ·4 3·
21	2·	1· 3· ·4
22	3· ·2 ·1	·4
23	O 1· 3·	·2 ·4
24	·3	·1 2· 4·
25	2· 1·	4· ·3 ●
26		·1 4· 3 ·2 ●
27	1·	4· 2· 3·
28	4· 2·	1· 3·
29	4· 2 3· ·1	
30	4· 3·	1· ·2

WASHINGTON MEAN TIME.

JULY.

d	h	m	s			
1	8	35		I.*	Oc.	Dis.
	12	2	30.2	I.	Ec.	Re.
	17	6		II.	Tr.	In.
	19	37		II.	Sh.	In.
	19	55		II.	Tr.	Eg.
	22	22		II.	Sh.	Eg.
2	5	55		I.	Tr.	In.
	7	10		I.	Sh.	In.
	8	12		I.*	Tr.	Eg.
	9	25		I.*	Sh.	Eg.
	11	29		III.	Oc.	Dis.
	14	33		III.	Oc.	Re.
	16	44	58.3	III.	Ec.	Dis.
	19	17	23.9	III.	Ec.	Re.
3	3	4		I.	Oc.	Dis.
	6	31	14.3	I.	Ec.	Re.
	12	17		II.	Oc.	Dis.
	17	29	50.1	II.	Ec.	Re.
4	0	25		I.	Tr.	In.
	1	39		I.	Sh.	In.
	2	41		I.	Tr.	Eg.
	3	54		I.	Sh.	Eg.
	21	33		I.	Oc.	Dis.
5	0	59	54.8	I.	Ec.	Re.
	6	26		II.	Tr.	In.
	8	55		II.*	Sh.	In.
	9	15		II.*	Tr.	Eg.
	11	40		II.	Sh.	Eg.
	18	54		I.	Tr.	In.
	20	7		I.	Sh.	In.
	21	10		I.	Tr.	Eg.
	22	22		I.	Sh.	Eg.
	23	26		IV.	Oc.	Dis.
6	1	27		III.	Tr.	In.
	1	57		IV.	Oc.	Re.
	4	32		III.	Tr.	Eg.
	6	33		III.	Sh.	In.
	9	17		III.*	Sh.	Eg.
	16	2		I.	Oc.	Dis.
	19	28	40.8	I.	Ec.	Re.
7	1	37		II.	Oc.	Dis.
	6	47	55.6	II.	Ec.	Re.
	13	23		I.	Tr.	In.
	14	36		I.	Sh.	In.
	15	39		I.	Tr.	Eg.
	16	51		I.	Sh.	Eg.
8	10	31		I.	Oc.	Dis.
	13	57	22.0	I.	Ec.	Re.
	19	46		II.	Tr.	In.
	22	13		II.	Sh.	In.
	22	35		II.	Tr.	Eg.
9	0	58		II.	Sh.	Eg.
	7	53		I.	Tr.	In.
	9	5		I.*	Sh.	In.
	10	9		I.*	Tr.	Eg.
	11	20		I.	Sh.	Eg.
	15	37		III.	Oc.	Dis.
	18	41		III.	Oc.	Re.
	20	41	31.1	III.	Ec.	Dis.
	23	15	47.5	III.	Ec.	Re.
10	5	1		I.	Oc.	Dis.
	8	26	6.2	I.*	Ec.	Re.
	14	58		II.	Oc.	Dis.
	20	5	35.8	II.	Ec.	Re.
11	2	22		I.	Tr.	In.
	3	33		I.	Sh.	In.
	4	38		I.	Tr.	Eg.

d	h	m	s			
11	5	48		I.	Sh.	Eg.
	23	30		I.	Oc.	Dis.
12	2	54	46.4	I.	Ec.	Re.
	9	7		II.*	Tr.	In.
	11	31		II.	Sh.	In.
	11	56		II.	Tr.	Eg.
	14	16		II.	Sh.	Eg.
	20	51		I.	Tr.	In.
	22	2		I.	Sh.	In.
	23	7		I.	Tr.	Eg.
13	0	17		I.	Sh.	Eg.
	5	36		III.	Tr.	In.
	8	40		III.*	Tr.	Eg.
	10	32		III.	Sh.	In.
	13	15		III.	Sh.	Eg.
	18	0		I.	Oc.	Dis.
	21	23	32.9	I.	Ec.	Re.
14	4	19		II.	Oc.	Dis.
	7	12		IV.	Tr.	In.
	9	23	33.8	II.*	Ec.	Re.
	9	40		IV.*	Tr.	Eg.
	15	21		I.	Tr.	In.
	16	31		I.	Sh.	In.
	17	37		I.	Tr.	Eg.
	18	46		I.	Sh.	Eg.
15	12	29		I.	Oc.	Dis.
	15	52	13.7	I.	Ec.	Re.
	22	28		II.	Tr.	In.
16	0	49		II.	Sh.	In.
	1	17		II.	Tr.	Eg.
	3	34		II.	Sh.	Eg.
	9	50		I.*	Tr.	In.
	10	59		I.	Sh.	In.
	12	6		I.	Tr.	Eg.
	13	14		I.	Sh.	Eg.
	19	48		III.	Oc.	Dis.
	22	52		III.	Oc.	Re.
17	0	44	23.0	III.	Ec.	Dis.
	3	14	30.0	III.	Ec.	Re.
	6	59		I.	Oc.	Dis.
	10	20	58.2	I.	Ec.	Re.
	17	40		II.	Oc.	Dis.
	22	41	10.2	II.	Ec.	Re.
18	4	20		I.	Tr.	In.
	5	28		I.	Sh.	In.
	6	36		I.	Tr.	Eg.
	7	43		I.	Sh.	Eg.
19	1	28		I.	Oc.	Dis.
	4	49	38.2	I.	Ec.	Re.
	11	50		II.	Tr.	In.
	14	7		II.	Sh.	In.
	14	39		II.	Tr.	Eg.
	16	52		II.	Sh.	Eg.
	22	49		I.	Tr.	In.
	23	57		I.	Sh.	In.
20	1	6		I.	Tr.	Eg.
	2	12		I.	Sh.	Eg.
	9	49		III.	Tr.	In.
	12	52		III.	Tr.	Eg.
	14	32		III.	Sh.	In.
	17	13		III.	Sh.	Eg.
	19	58		I.	Oc.	Dis.
	23	18	24.7	I.	Ec.	Re.
21	7	1		II.	Oc.	Dis.
	11	59	0.7	II.	Ec.	Re.
	17	19		I.	Tr.	In.
	18	26		I.	Sh.	In.

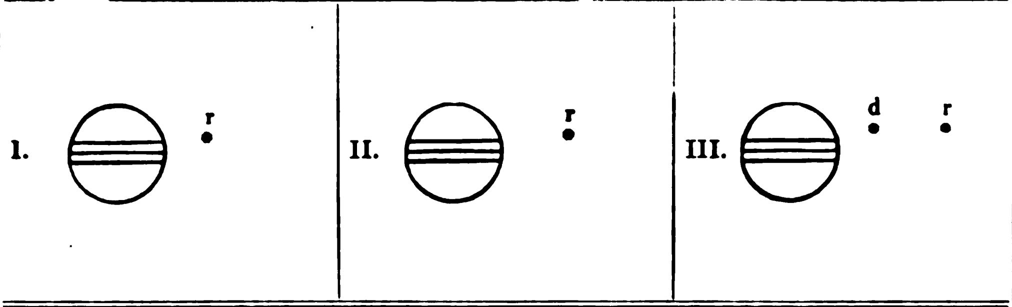
d	h	m	s			
21	19	35		I.	Tr.	Eg.
	20	41		I.	Sh.	Eg.
22	14	27		I.	Oc.	Dis.
	17	47	5.5	I.	Ec.	Re.
	18	34		IV.	Oc.	Dis.
	21	1		IV.	Oc.	Re.
23	1	12		II.	Tr.	In.
	3	25		II.	Sh.	In.
	4	1		II.	Tr.	Eg.
	6	10		II.	Sh.	Eg.
	11	48		I.	Tr.	In.
	12	55		I.	Sh.	In.
	14	5		I.	Tr.	Eg.
	15	10		I.	Sh.	Eg.
24	0	2		III.	Oc.	Dis.
	3	5		III.	Oc.	Re.
	4	43	38.0	III.	Ec.	Dis.
	7	12	35.2	III.	Ec.	Re.
	8	57		I.*	Oc.	Dis.
	12	15	50.0	I.	Ec.	Re.
	20	23		II.	Oc.	Dis.
25	1	16	33.2	II.	Ec.	Re.
	6	18		I.	Tr.	In.
	7	24		I.	Sh.	In.
	8	35		I.*	Tr.	Eg.
	9	39		I.	Sh.	Eg.
26	3	27		I.	Oc.	Dis.
	6	44	29.6	I.	Ec.	Re.
	14	34		II.	Tr.	In.
	16	44		II.	Sh.	In.
	17	23		II.	Tr.	Eg.
	19	28		II.	Sh.	Eg.
27	0	47		I.	Tr.	In.
	1	52		I.	Sh.	In.
	3	4		I.	Tr.	Eg.
	4	7		I.	Sh.	Eg.
	14	4		III.	Tr.	In.
	17	7		III.	Tr.	Eg.
	18	31		III.	Sh.	In.
	21	12		III.	Sh.	Eg.
	21	57		I.	Oc.	Dis.
28	1	13	15.8	I.	Ec.	Re.
	9	45		II.	Oc.	Dis.
	14	34	15.8	II.	Ec.	Re.
	19	17		I.	Tr.	In.
	20	21		I.	Sh.	In.
	21	34		I.	Tr.	Eg.
	22	36		I.	Sh.	Eg.
29	16	26		I.	Oc.	Dis.
	19	41	56.5	I.	Ec.	Re.
30	3	57		II.	Tr.	In.
	6	2		II.	Sh.	In.
	6	45		II.	Tr.	Eg.
	8	46		II.*	Sh.	Eg.
	13	47		I.	Tr.	In.
	14	50		I.	Sh.	In.
	16	4		I.	Tr.	Eg.
	17	4		I.	Sh.	Eg.
31	2	37		IV.	Tr.	In.
	4	18		III.	Oc.	Dis.
	4	58		IV.	Tr.	Eg.
	7	20		III.	Oc.	Re.
	8	42	45.6	III.*	Ec.	Dis.
	10	56		I.	Oc.	Dis.
	11	10	32.6	III.	Ec.	Re.
	14	10	41.1	I.	Ec.	Re.
	23	7		II.*	Oc.	Dis.

Note.—In. denotes ingress; Eg., egress; Dis., disappearance; Re., reappearance; Ec., eclipse. Oc. denotes occultation Tr., transit of the satellite; Sh., transit of the shadow; *Visible at Washington.

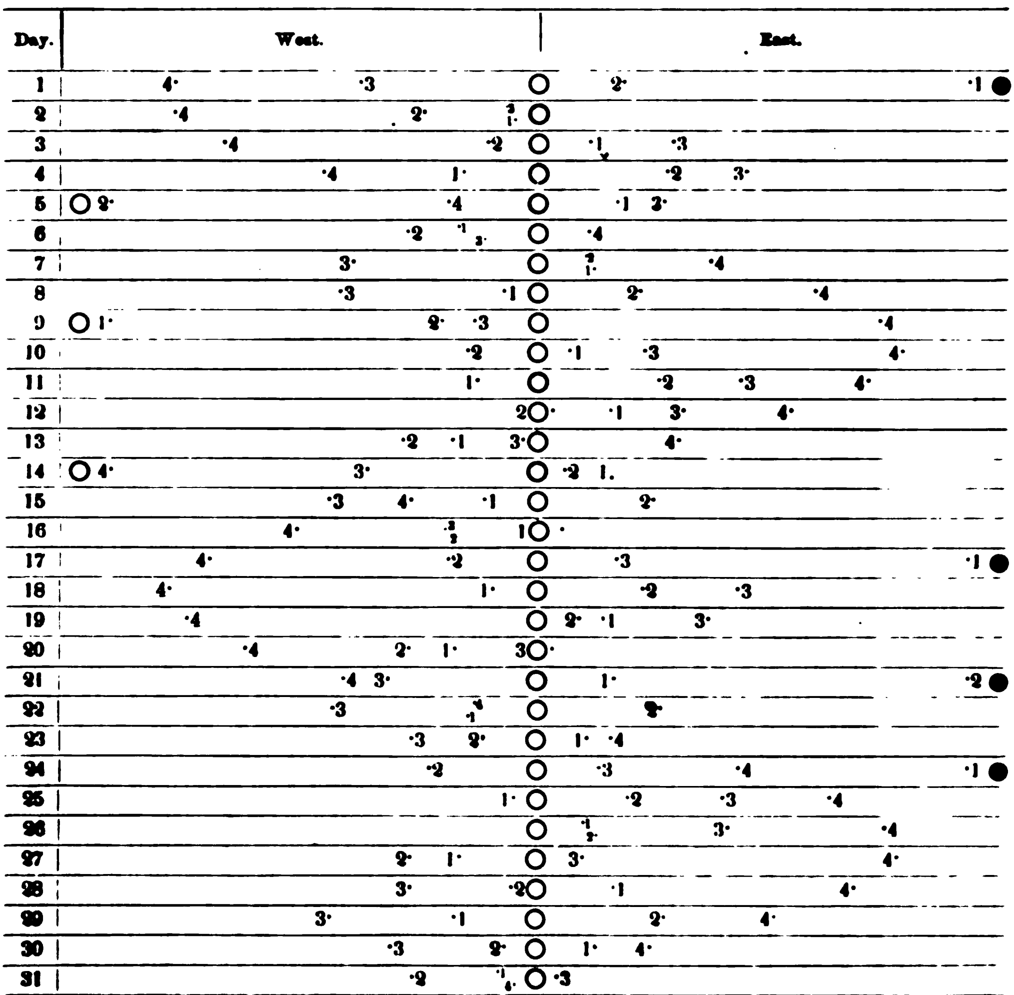
WASHINGTON MEAN TIME.

JULY.

Phases of the Eclipses of the Satellites for an Inverting Telescope.



Configurations at 9ʰ 0ᵐ for an Inverting Telescope.



WASHINGTON MEAN TIME.

AUGUST.

d	h	m	s			
1	3	51	44.2	II.	Ec.	Re.
	8	17		I.*	Tr.	In.
	9	18		I.	Sh.	In.
	10	33		I.	Tr.	Eg.
	11	33		I.	Sh.	Eg.
2	5	26		I.	Oc.	Dis.
	8	39	20.2	I.*	Ec.	Re.
	17	20		II.	Tr.	In.
	19	20		II.	Sh.	In.
	20	8		II.	Tr.	Eg.
	22	4		II.	Sh.	Eg.
3	2	47		I.	Tr.	In.
	3	47		I.	Sh.	In.
	5	3		I.	Tr.	Eg.
	6	1		I.	Sh.	Eg.
	18	22		III.	Tr.	In.
	21	23		III.	Tr.	Eg.
	22	31		III.	Sh.	In.
	23	56		I.	Oc.	Dis.
4	1	10		III.	Sh.	Eg.
	3	8	6.2	I.	Ec.	Re.
	12	30		II.	Oc.	Dis
	17	9	19.3	II.	Ec.	Re.
	21	17		I.	Tr.	In.
	22	16		I.	Sh.	In.
	23	33		I.	Tr.	Eg.
5	0	30		I.	Sh.	Eg.
	18	26		I.	Oc.	Dis.
	21	36	46.3	I.	Ec.	Re.
6	6	43		II.	Tr.	In.
	8	38		II.*	Sh.	In.
	9	31		II.	Tr.	Eg.
	11	22		II.	Sh.	Eg.
	15	46		I.	Tr.	In.
	16	44		I.	Sh.	In.
	18	3		I.	Tr.	Eg.
	18	58		I.	Sh.	Eg.
7	8	36		III.	Oc.	Dis.
	11	38		III.	Oc.	Re.
	12	41	54.2	III.	Ec.	Dis.
	12	56		I.	Oc.	Dis.
	15	8	30.8	III.	Ec.	Re.
	16	5	30.5	I.	Ec.	Re.
8	1	52		II.	Oc.	Dis.
	6	26	43.3	II.	Ec.	Re.
	10	16		I.	Tr.	In.
	11	13		I.	Sh.	In.
	12	33		I.	Tr.	Eg.
	13	27		I.	Sh.	Eg.
	14	19		IV.	Oc.	Dis.
	16	33		IV.	Oc.	Re.
9	7	26		I.	Oc.	Dis.
	10	34	9.2	I.	Ec.	Re.
	20	6		II.	Tr.	In.
	21	57		II.	Sh.	In.
	22	54		II.	Tr.	Eg.
10	0	41		II.	Sh.	Eg.
	4	46		I.	Tr.	In.
	5	41		I.	Sh.	In.
	7	3		I.	Tr.	Eg.
	7	56		I.*	Sh.	Eg.
	22	42		III.	Tr.	In.
11	1	42		III.	Tr.	Eg.
	1	56		I.	Oc.	Dis.
	2	30		III.	Sh.	In.

d	h	m	s			
11	5	2	54.6	I.	Ec.	Re.
	5	9		III.	Sh.	Eg.
	15	15		II.	Oc.	Dis.
	19	44	10.9	II.	Ec.	Re.
	23	16		I.	Tr.	In.
12	0	10		I.	Sh.	In.
	1	33		I.	Tr.	Eg.
	2	24		I.	Sh.	Eg.
	20	26		I.	Oc.	Dis.
	23	31	34.1	I.	Ec.	Re.
13	9	30		II.	Tr.	In.
	11	15		II.	Sh.	In.
	12	18		II.	Tr.	Eg.
	13	59		II.	Sh.	Eg.
	17	46		I.	Tr.	In.
	18	38		I.	Sh.	In.
	20	3		I.	Tr.	Eg.
	20	53		I.	Sh.	Eg.
14	12	57		III.	Oc.	Dis.
	14	56		I.	Oc.	Dis.
	15	57		III.	Oc.	Re.
	16	41	7.8	III.	Ec.	Dis.
	18	0	18.0	I.	Ec.	Re.
	19	6	34.2	III.	Ec.	Re.
15	4	38		II.	Oc.	Dis.
	9	1	30.1	II.	Ec.	Re.
	12	16		I.	Tr.	In.
	13	7		I.	Sh.	In.
	14	33		I.	Tr.	Eg.
	15	22		I.	Sh.	Eg.
16	9	26		I.	Oc.	Dis.
	12	28	56.1	I.	Ec.	Re.
	22	36		IV.	Tr.	In.
	22	54		II.	Tr.	In.
17	0	33		II.	Sh.	In.
	0	41		IV.	Tr.	Eg.
	1	42		II.	Tr.	Eg.
	3	17		II.	Sh.	Eg.
	6	46		I.	Tr.	In.
	7	35		I.*	Sh.	In.
	9	3		I.	Tr.	Eg.
	9	50		I.	Sh.	Eg.
18	3	3		III.	Tr.	In.
	3	56		I.	Oc.	Dis.
	6	2		III.	Tr.	Eg.
	6	29		III.	Sh.	In.
	6	57	40.8	I.	Ec.	Re.
	9	6		III.	Sh.	Eg.
	18	1		II.	Oc.	Dis.
	22	18	50.5	II.	Ec.	Re.
19	1	16		I.	Tr.	In.
	2	4		I.	Sh.	In.
	3	33		I.	Tr.	Eg.
	4	19		I.	Sh.	Eg.
	22	26		I.	Oc.	Dis.
20	1	26	19.9	I.	Ec.	Re.
	12	18		II.	Sh.	In.
	13	51		II.	Sh.	In.
	15	6		II.	Tr.	Eg.
	16	35		II.	Sh.	Eg.
	19	46		I.	Tr.	In.
	20	33		I.	Sh.	In.
	22	3		I.	Tr.	Eg.
	22	48		I.	Sh.	Eg.
21	16	56		I.	Oc.	Dis.

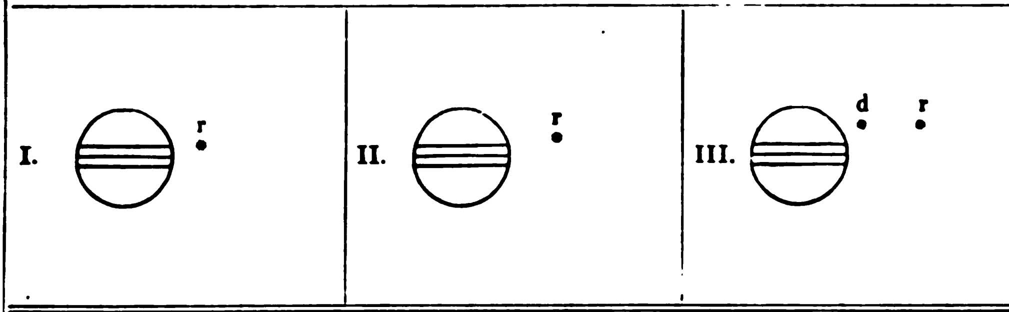
d	h	m	s			
21	17	20		III.	Oc.	Dis.
	19	55	3.2	I.	Ec.	Re.
	20	18		III.	Oc.	Re.
	20	40	56.4	III.	Ec.	Dis.
	23	5	12.4	III.	Ec.	Re.
22	7	24		II.*	Oc.	Dis.
	11	36	4.7	II.	Ec.	Re.
	14	16		I.	Tr.	In.
	15	1		I.	Sh.	In.
	16	33		I.	Tr.	Eg.
	17	16		I.	Sh.	Eg.
23	11	27		I.	Oc.	Dis.
	14	23	40.5	I.	Ec.	Re.
24	1	42		II.	Tr.	In.
	3	10		II.	Sh.	In.
	4	30		II.	Tr.	Eg.
	5	54		II.	Sh.	Eg.
	8	46		I.	Tr.	In.
	9	30		I.	Sh.	In.
	11	3		I.	Tr.	Eg.
	11	45		I.	Sh.	Eg.
25	5	57		I.	Oc.	Dis.
	7	26		III.*	Tr.	In.
	8	52	24.9	I.	Ec.	Re.
	10	23		III.	Tr.	Eg.
	10	28		III.	Sh.	In.
	10	33		IV.	Oc.	Dis.
	12	25		IV.	Oc.	Re.
	13	4		III.	Sh.	Eg.
	20	48		II.	Oc.	Dis.
26	0	53	18.7	II.	Ec.	Re.
	3	17		I.	Tr.	In.
	3	59		I.	Sh.	In.
	5	33		I.	Tr.	Eg.
	6	14		I.	Sh.	Eg.
27	0	27		I.	Oc.	Dis.
	3	21	3.3	I.	Ec.	Re.
	15	6		II.	Tr.	In.
	16	28		II.	Sh.	In.
	17	55		II.	Tr.	Eg.
	19	12		II.	Sh.	Eg.
	21	47		I.	Tr.	In.
	22	27		I.	Sh.	In.
28	0	3		I.	Tr.	Eg.
	0	42		I.	Sh.	Eg.
	18	57		I.	Oc.	Dis.
	21	45		III.	Oc.	Dis.
	21	49	46.2	I.	Ec.	Re.
29	3	3	21.8	III.	Ec.	Re.
	10	11		II.	Oc.	Dis.
	14	10	28.5	II.	Ec.	Re.
	16	17		I.	Tr.	In.
	16	56		I.	Sh.	In.
	18	33		I.	Tr.	Eg.
	19	11		I.	Sh.	Eg.
30	13	27		I.	Oc.	Dis.
	16	18	22.5	I.	Ec.	Re.
31	4	31		II.	Tr.	In.
	5	47		II.	Sh.	In.
	7	20		II.*	Tr.	Eg.
	8	30		II.	Sh.	Eg.
	10	47		I.	Tr.	In.
	11	24		I.	Sh.	In.
	13	3		I.	Tr.	Eg.
	13	39		I.	Sh.	Eg.

NOTE.—In. denotes ingress; Eg., egress; Dis., disappearance; Re., reappearance; Ec., eclipse. Oc. denotes occultation; Tr., transit of the satellite; Sh., transit of the shadow; * Visible at Washington.

WASHINGTON MEAN TIME.

AUGUST.

Phases of the Eclipses of the Satellites for an Inverting Telescope.



Configurations at 8h 0m for an Inverting Telescope.

Day.	West.	East.
1	4· 1	○· ·2 ·3
2	4·	○ ·1 2· 3·
3	4· 2· 1·	○ 3·
4	4· 3· ·2	○ ·1
5	·4 3· 1·	○ ·2
6	○ 2· ·4 ·3	○ 1·
7	·4 ·2 ·1 ·	○3
8	·4	○ 1· 2 ·3
9		○ 4 2· 3· ·1 ●
10	2· 1·	○ 3· ·4
11	3 2·	○ ·1 ·4
12	3· 1·	○ ·2 ·4
13	·3	○ 2· ·1 4·
14	2· ·1 ·3	○ 4·
15		○ ·2 1· ·3 4·
16	·1	○ 4· 2· ·3
17	○ 1· 2· 4·	○ 3·
18	4· ·2 3·	○ ·1
19	4· 3· 1·	○ ·2
20	4· ·3 ·	○ 2· ·1
21	·4 2· 3 ·1	○
22	·4	○ 1· ·3 ·2 ●
23	·4 ·1	○ 2· ·3
24	·4 2· 1	○ · 3·
25	○ 3· ·2 ·	○4 ·1 ●
26	3· 1·	○ ·2 ·4
27	·3	○ ·1 2· ·4
28	2· 3 1·	○ ·4
29	·2	○ 3 1· ·4
30	·1	○ ·2 ·3 4·
31	2·	○ 1· 3· 4·

WASHINGTON MEAN TIME.

SEPTEMBER.

d	h	m	s				d	h	m	s				d	h	m	s		
1	7	58		I.	Oc.	Dis.	3	21	48		II.	Sh.	Eg.	7	10	8		II.	Tr.
	10	47	6.1	I.	Ec.	Re.		23	47		I.	Tr.	In.		11	7		II.	Sh.
	11	50		III.	Tr.	In.	4	0	21		I.	Sh.	In.		12	48		I.	Tr.
	14	26		III.	Sh.	In.		2	3		I.	Tr.	Eg.		13	19		I.	Sh.
	14	46		III.	Tr.	Eg.		2	36		I.	Sh.	Eg.		15	3		I.	Tr.
	17	2		III.	Sh.	Eg.		20	58		I.	Oc.	Dis.		15	33		I.	Sh.
	23	35		II.	Oc.	Dis.		23	44	25.8	I.	Ec.	Re.	8	9	59		I.	Oc.
2	3	27	35.8	II.	Ec.	Re.	5	2	11		III.	Oc.	Dis.		12	41	43.8	I.	Ec.
	5	17		I.	Tr.	In.		7	1	45.5	III.	Ec.	Re.		16	16		III.	Tr.
	5	53		I.	Sh.	In.		12	58		II.	Oc.	Dis.		18	25		III.	Sh.
	7	33		I.	Tr.	Eg.		16	44	40.1	II.	Ec.	Re.		19	9		III.	Tr.
	8	8		I.	Sh.	Eg.		18	18		I.	Tr.	In.		20	59		III.	Sh.
	19	2		IV.	Tr.	In.		18	50		I.	Sh.	In.	9	2	22		II.	Oc.
	20	41		IV.	Tr.	Eg.		20	33		I.	Tr.	Eg.		6	1	41.5	II.	Ec.
3	2	26		I.	Oc.	Dis.		21	5		I.	Sh.	Eg.		7	18		I.	Tr.
	5	15	43.7	I.	Ec.	Re.	6	15	29		I.	Oc.	Dis.		7	48		I.	Sh.
	17	55		II.	Tr.	In.		18	13	1.0	I.	Ec.	Re.		9	34		I.	Tr.
	19	5		II.	Sh.	In.	7	7	20		II.	Tr.	In.		10	2		I.	Sh.
	20	44		II.	Tr.	Eg.		8	24		II.	Sh.	In.						

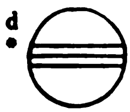
The satellites are not visible from September 9 to November 7, Jupiter being too near the

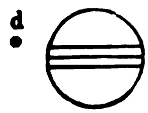
NOTE.—In. denotes ingress; Eg., egress; Dis., disappearance; Re., reappearance; Ec., eclipse.
Oc. denotes occultation; Tr., transit of the satellite; Sh., transit of the shadow; * Visible at Washin

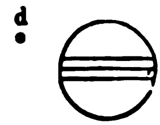
WASHINGTON MEAN TIME.

NOVEMBER.

Phases of the Eclipses of the Satellites for an Inverting Telescope.

I.


II.


III.


Configurations at 17ʰ 30ᵐ for an Inverting Telescope.

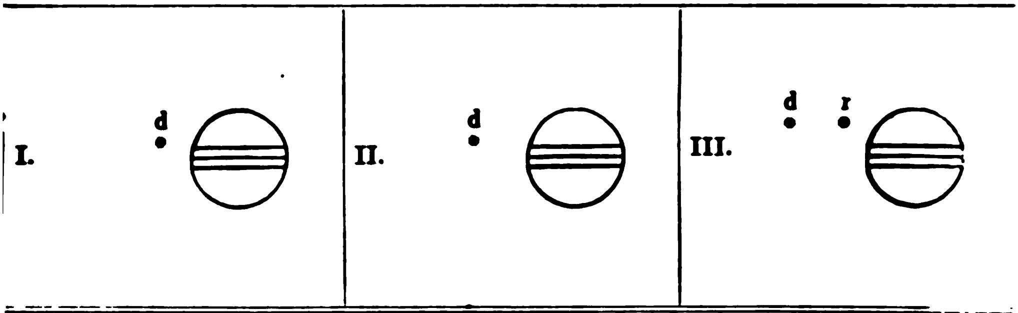
Day.	West.		East.
7	·3 2·	O	·1 4·
8	1· ·3	O	·2 4·
9	4·	O	·1 2· ·3
10	4· 1· 2	O	3·
11	4· ·2	O	1. 3·
12	4· ·1 3·	⊙	·2
13	·4 3·	O	1· 2·
14	·4 ·3 2·	O	·1 ●
15	·4 3 1·	O	·2 ●
16	·4	O	·1 3 2·
17	1· 2·	·4 O	·3
18	·2	O	·1 4 3·
19	·1 3·	O	·2 ·4
20	3·	O	1· 2· ·4
21	·3 2· ·1	O	·4
22	O 1· ·3 .2	O	4·
23		O	·1 ·3 ·2 4·
24	1· 2·	O	4· ·3
25	·2	O	4· ·1 3·
26	O 3· 1 4·	O	·2
27	4· 3·	O	1· 2·
28	4· ·3 2· ·1	O	
29	4· ·3 ·2	O	1·
30	·4	O	·3 ·2 ·1 ●

Note.—In. denotes ingress; Eg., egress; Dis., disappearance; Re., reappearance; Ec., eclipse.
Oc. denotes occultation; Tr., transit of the satellite; Sh., transit of the shadow; * Visible at Washingt

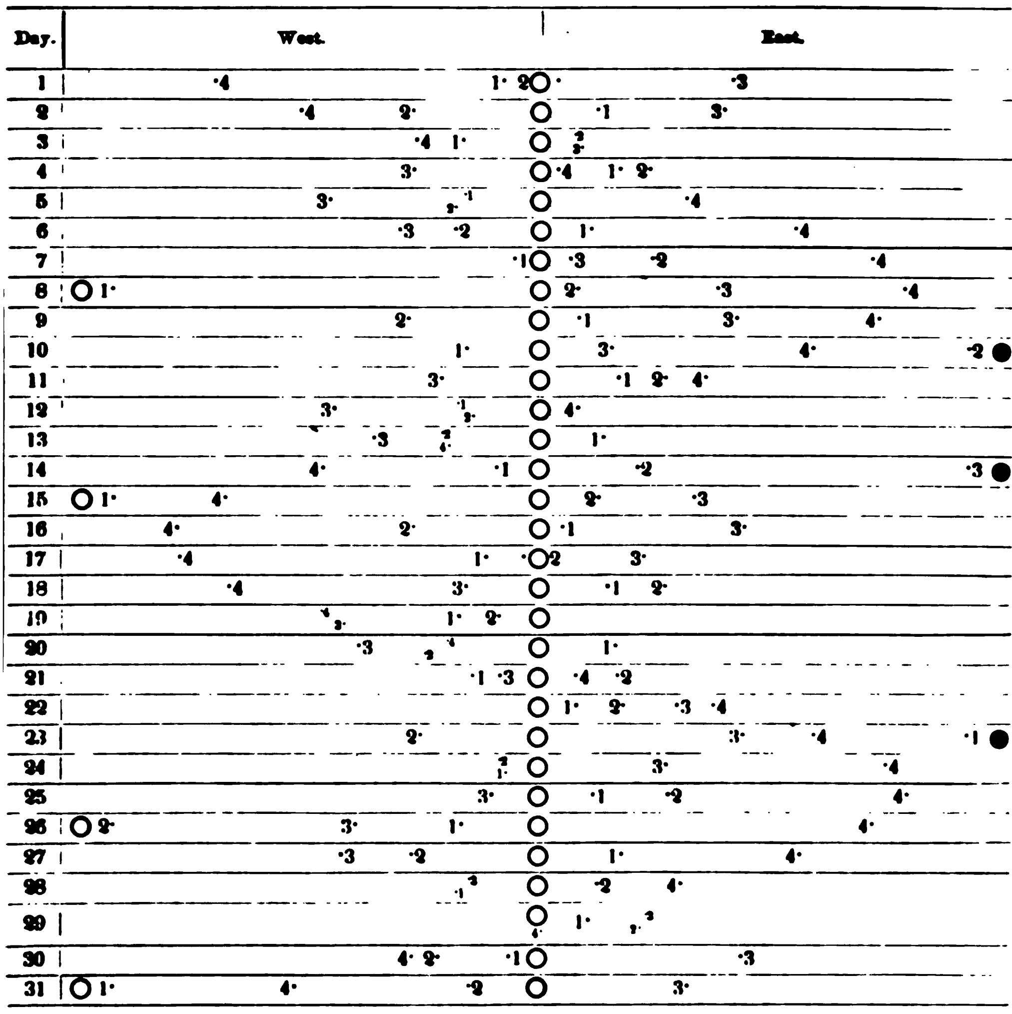
WASHINGTON MEAN TIME.

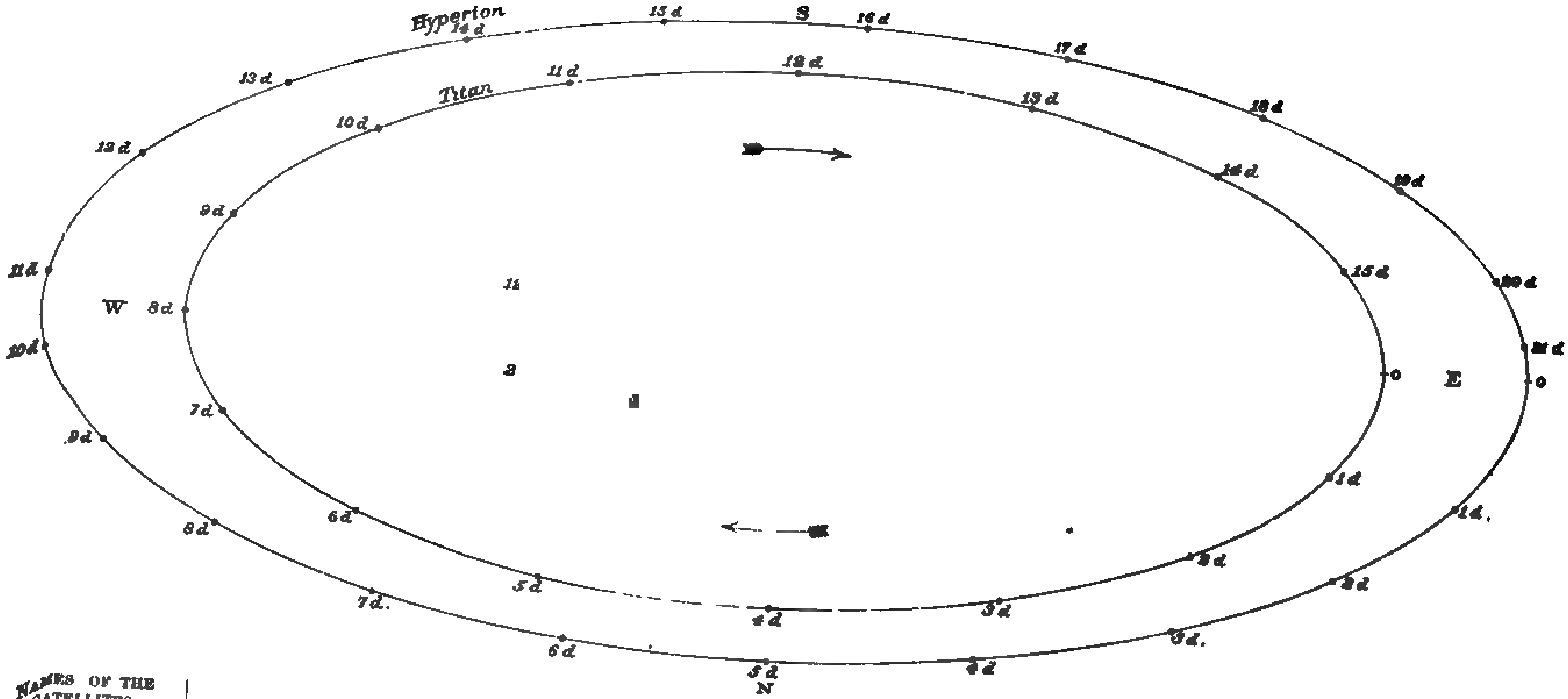
DECEMBER.

Phases of the Eclipses of the Satellites for an Inverting Telescope.



Configurations at 17h 0m for an Inverting Telescope.





NAMES OF THE SATELLITES.

I. Mimas.
II. Enceladus.
III. Tethys.
IV. Dione.
V. Rhea.
VI. Titan.
VII. Hyperion
VIII. Japetus

APPARENT ORBITS OF THE SEVEN INNER SATELLITES OF SATURN IN 1885 AND 1886, AS SEEN IN AN INVERTING TELESCOPE.

MEAN SYNODIC PERIODS.

	d	h
I.	0	22.6
II.	1	8.9
III.	1	21.3
IV.	2	17.7
V.	4	12.5
VI.	15	[illegible]

WASHINGTON MEAN TIMES OF ELONGATION, ETC.

In the diagram on the preceding page, the points of the orbits marked "o" are those of the eastern elongation, as seen in an inverting telescope. The apparent positions of a satellite at any time may be marked on the diagram by counting around the orbit the interval in days and hours which has elapsed since the last east elongation. The times of these elongations may be found from the following tables. Mimas can be seen only within a few hours of each elongation: the time of every elongation visible at Washington is therefore given. The times of other elongations of any satellite in the same direction may be found by adding or subtracting any multiple of the period. For the three outer satellites the times of elongation and conjunction are given. The following abbreviations are used:—

E., East Elongation,
I., Inferior Conjunction (north of planet),
W., West Elongation,
S., Superior Conjunction (south of planet).

MIMAS.

Elongations Visible at Washington.

	d	h			d	h			d	h			d	h			d	h			d	h	
Jan.	3	11.3	E.	Feb.	5	10.7	E.	Mar.	10	10.4	E.	Oct.	5	17.2	E.	Nov.	10	12.8	E.	Dec.	12	13.9	E.
	4	10.0	E.		6	9.3	E.		11	9.0	E.		6	15.8	E.		11	11.4	E.		13	12.5	E.
	5	8.6	E.		7	7.9	E.		12	7.6	E.		7	14.4	E.		12	10.0	E.		14	11.1	E.
	6	7.2	E.		8	6.5	E.		13	6.2	E.		8	13.1	E.		17	14.4	W.		15	9.7	E.
	7	5.8	E.		13	10.9	W.		18	10.7	W.		13	17.5	W.		18	13.0	W.		16	8.3	E.
	11	11.5	W.		14	9.6	W.		19	9.3	W.		14	16.1	W.		19	11.7	W.		17	6.9	E.
	12	10.1	W.		15	8.2	W.		20	7.9	W.		15	14.7	W.		20	10.3	W.		18	5.5	E.
	13	8.7	W.		16	6.8	W.		21	6.5	W.		16	13.3	W.		21	8.9	W.		21	12.7	W.
	14	7.3	W.		17	5.4	W.		27	9.5	E.		22	16.4	E.		25	14.6	E.		22	11.3	W.
	15	5.9	W.		21	11.2	E.		28	8.1	E.		23	15.0	E.		26	13.2	E.		23	9.9	W.
	19	11.6	E.		22	9.9	E.		29	6.8	E.		24	13.6	E.		27	11.9	E.		24	8.5	W.
	20	10.2	E.		23	8.5	E.	Apr	4	9.8	W.		25	12.2	E.		28	10.5	E.		25	7.1	W.
	21	8.8	E.		24	7.2	E.		5	8.4	W.		30	16.7	W.		29	9.2	E.		26	5.7	W.
	22	7.5	E.		25	5.8	E.		6	7.0	W.		31	15.3	W.	Dec.	4	13.6	W.		29	12.8	E.
	23	6.1	E.	Mar.	1	11.5	W.		12	10.1	E.	Nov.	1	13.9	W.		5	12.2	W.		30	11.4	E.
	28	10.5	W.		2	10.1	W.		13	8.7	E.		2	12.5	W.		6	10.8	W.		31	10.0	E.
	29	9.1	W.		3	8.7	W.		14	7.3	E.		7	16.9	E.		7	9.4	W.	1887			
	30	7.7	W.		4	7.3	W.		21	9.1	W.		8	15.5	E.		8	8.1	W.	Jan.	1	8.6	E.
	31	6.4	W.		5	6.0	W.		22	7.7	W.		9	14.1	E.		9	6.7	W.		2	7.2	E.

ENCELADUS.

	d	h			d	h			d	h			d	h			d	h			d	h	
Jan.	1	20.5	E.	Jan.	15	13.5	E.	Jan.	29	6.2	E.	Feb.	11	23.0	E.	Feb.	25	15.9	E.	Mar.	11	8.7	E.
	3	5.4	E.		16	22.4	E.		30	15.1	E.		13	7.9	E.		27	0.7	E.		12	17.6	E.
	4	14.4	E.		18	7.2	E.	Feb.	1	0.0	E.		14	16.8	E.		28	9.6	E.		14	2.5	E.
	5	23.4	E.		19	16.1	E.		2	8.9	E.		16	1.7	E.	Mar.	1	18.5	E.		15	11.4	E.
	7	8.3	E.		21	0.9	E.		3	17.8	E.		17	10.6	E.		3	3.4	E.		16	20.3	E.
	8	17.2	E.		22	9.8	E.		5	2.7	E.		18	19.5	E.		4	12.3	E.		18	5.2	E.
	10	2.0	E.		23	18.7	E.		6	11.5	E.		20	4.4	E.		5	21.2	E.		19	14.1	E.
	11	10.9	E.		25	3.6	E.		7	20.4	E.		21	13.3	E.		7	6.0	E.		20	23.0	E.
	12	19.7	E.		26	12.5	E.		9	5.2	E.		22	22.1	E.		8	14.9	E.		22	7.8	E.
	14	4.6	E.		27	21.4	E.		10	14.1	E.		24	7.0	E.		9	23.8	E.		23	16.7	E.

WASHINGTON MEAN TIMES OF EAST ELONGATIONS.

ENCELADUS—(*Concluded.*)

	d h		d h		d h		d h		d h		d h
Mar.	25 1.6 E.	Apr.	14 15.0 E.	Oct.	18 1.3 E.	Nov.	7 14.7 E.	Nov.	28 4.0 E.	Dec.	18 17.
	26 10.5 E.		15 23.9 E.		19 10.2 E.		8 23.6 E.		29 12.9 E.		20 2.
	27 19.4 E.		17 8.8 E.		20 19.1 E.		10 8.4 E.		30 21.7 E.		21 10.
	29 4.3 E.		18 17.6 E.		22 4.0 E.		11 17.3 E.	Dec.	2 6.6 E.		22 19.
	30 13.2 E.		20 2.5 E.		23 12.9 E.		13 2.2 E.		3 15.5 E.		24 4.
	31 22.1 E.		21 11.4 E.		24 21.8 E.		14 11.1 E.		5 0.3 E.		25 13.
Apr.	2 7.0 E.		22 20.3 E.		26 6.7 E.		15 20.0 E.		6 9.2 E.		26 22.
	3 15.9 E.		24 5.2 E.		27 15.5 E.		17 4.9 E.		7 18.0 E.		28 7.
	5 0.7 E.		25 14.2 E.		29 0.4 E.		18 13.8 E.		9 2.9 E.		29 16.
	6 9.6 E.				30 9.3 E.		19 22.7 E.		10 11.8 E.		31 1.
	7 18.5 E.	Oct.	11 4.9 E.		31 18.2 E.		21 7.6 E.		11 20.7 E.	1887	
	9 3.4 E.		12 13.8 E.	Nov.	2 3.1 E.		22 16.5 E.		13 5.6 E.	Jan.	1 9
	10 12.3 E.		13 22.6 E.		3 12.0 E.		24 1.3 E.		14 14.4 E.		2 18
	11 21.2 E.		15 7.5 E.		4 20.9 E.		25 10.2 E.		15 23.3 E.		4 3
	13 6.1 E.		16 16.4 E.		6 5.8 E.		26 19.1 E.		17 8.2 E.		5 12

TETHYS.

	d h		d h		d h		d h		d h		d
Jan.	1 14.1 E.	Feb.	8 8.1 E.	Mar.	18 2.2 E.	Apr.	24 20.7 E.	Oct.	28 20.7 E.	Dec.	5 1
	3 11.5 E.		10 5.4 E.		19 23.5 E.		26 18.1 E.		30 18.0 E.		7 1
	5 8.8 E.		12 2.7 E.		21 20.8 E.		28 15.4 E.	Nov.	1 15.3 E.		9
	7 6.2 E.		14 0.1 E.		23 18.2 E.				3 12.6 E.		11
	9 3.5 E.		15 21.4 E.		25 15.5 E.				5 9.9 E.		13
	11 0.8 E.		17 18.7 E.		27 12.9 E.	Sept.	30 13.0 E.		7 7.2 E.		15
	12 22.1 E.		19 16.0 E.		29 10.2 E.	Oct.	2 10.3 E.		9 4.6 E.		16 2
	14 19.4 E.		21 13.4 E.		31 7.6 E.		4 7.6 E.		11 1.9 E.		18 1
	16 16.7 E.		23 10.7 E.	Apr.	2 4.9 E.		6 5.0 E.		12 23.3 E.		20 1
	18 14.0 E.		25 8.0 E.		4 2.2 E.		8 2.3 E.		14 20.6 E.		22 1
	20 11.3 E.		27 5.3 E.		5 23.5 E.		9 23.6 E.		16 17.9 E.		24 1
	22 8.5 E.	Mar.	1 2.5 E.		7 20.8 E.		11 20.9 E.		18 15.2 E.		26
	24 5.8 E.		2 23.8 E.		9 18.1 E.		13 18.2 E.		20 12.4 E.		28
	26 3.1 E.		4 21.1 E.		11 15.4 E.		15 15.5 E.		22 9.7 E.		30
	28 0.4 E.		6 18.4 E.		13 12.7 E.		17 12.8 E.		24 7.0 E.	1887	
	29 21.7 E.		8 15.8 E.		15 10.1 E.		19 10.1 E.		26 4.3 E.	Jan.	1
	31 19.0 E.		10 13.1 E.		17 7.4 E.		21 7.5 E.		28 1.6 E.		2 2
Feb.	2 16.3 E.		12 10.4 E.		19 4.7 E.		23 4.8 E.		29 22.9 E.		4 1
	4 13.6 E.		14 7.7 E.		21 2.0 E.		25 2.1 E.	Dec.	1 20.1 E.		6 1
	6 10.8 E.		16 4.9 E.		22 23.4 E.		26 23.4 E.		3 17.4 E.		

DIONE.

	d h		d h		d h		d h		d h		d
Jan.	2 21.7 E.	Feb.	4 17.7 E.	Mar.	9 13.8 E.	Apr.	11 10.3 E.	Oct.	28 9.3 E.	Nov.	30 5
	5 15.4 E.		7 11.4 E.		12 7.5 E.		14 4.0 E.		31 3.0 E.	Dec.	2 2
	8 9.1 E.		10 5.0 E.		15 1.2 E.		16 21.7 E.	Nov.	2 20.7 E.		5 1
	11 2.7 E.		12 22.7 E.		17 18.9 E.		19 15.4 E.		5 14.4 E.		8 1
	13 20.4 E.		15 16.4 E.		20 12.6 E.				8 8.1 E.		11 4
	16 14.0 E.		18 10.0 E.		23 6.3 E.	Oct.	9 5.4 E.		11 1.8 E.		13 21
	19 7.7 E.		21 3.7 E.		26 0.0 E.		11 23.1 E.		13 19.5 E.		16 1
	22 1.3 E.		23 21.4 E.		28 17.7 E.		14 16.8 E.		16 13.1 E.		19
	24 19.0 E.		26 15.1 E.		31 11.4 E.		17 10.5 E.		19 6.8 E.		22
	27 12.7 E.	Mar.	1 8.8 E.	Apr.	3 5.1 E.		20 4.2 E.		22 0.5 E.		24 2
	30 6.3 E.		4 2.5 E.		5 22.8 E.		22 21.9 E.		24 18.2 E.		27 14
Feb.	2 0.0 E.		6 20.2 E.		8 16.5 E.		25 15.6 E.		27 11.8 E.		30 7

RHEA.		TITAN.		HYPERION.	
d h	d h	d h	d h	d h	d h
Jan. 4 12.5 E.	Oct. 2 19.8 E.	Jan. 2 12.0 S.	Oct. 1 11.4 S.	Jan. 2 21.0 S.	Sep. 16 11.0 S.
9 1.0 E.	7 8.4 E.	6 12.0 E.	5 11.5 E.	8 5.0 E.	21 19.0 E.
13 13.5 E.	11 20.9 E.	10 12.0 I.	9 11.6 I.	13 13.0 I.	27 3.1 I.
18 1.9 E.	16 9.3 E.	14 11.8 W.	13 11.7 W.	18 21.0 W.	Oct. 2 11.2 W.
22 14.2 E.	20 21.8 E.	18 11.3 S.	17 11.6 S.	24 4.9 S.	7 19.5 S.
27 2.6 E.	25 10.3 E.	22 10.7 E.	21 11.5 E.	29 12.6 E.	13 3.8 E.
31 14.9 E.	29 22.7 E.	26 10.3 I.	25 11.2 I.	Feb. 3 20.0 I.	18 12.0 I.
Feb. 5 3.2 E.	Nov. 3 11.2 E.	30 9.8 W.	29 11.0 W.	9 3.2 W.	23 20.0 W.
9 15.6 E.	7 23.6 E.	Feb. 3 9.4 S.	Nov. 2 10.8 S.	14 10.5 S.	29 3.9 S.
14 3.9 E.	12 12.0 E.	7 9.0 E.	6 10.5 E.	19 18.0 E.	Nov. 3 11.7 E.
18 16.3 E.	17 0.5 E.	11 8.5 I.	10 10.0 I.	25 1.5 I.	8 19.3 I.
23 4.7 E.	21 12.9 E.	15 8.0 W.	14 9.6 W.	Mar. 2 8.8 W.	14 2.5 W.
27 17.1 E.	26 1.2 E.	19 7.5 S.	18 9.1 S.	7 16.0 S.	19 9.8 S.
Mar. 4 5.6 E.	30 13.6 E.	23 7.0 E.	22 8.7 E.	12 23.5 E.	24 17.2 E.
8 18.0 E.	Dec. 5 2.0 E.	27 6.4 I.	26 8.2 I.	18 7.5 I.	30 0.6 I.
13 6.4 E.	9 14.3 E.	Mar. 3 5.8 W.	30 7.6 W.	23 15.8 W.	Dec. 5 8.0 W.
17 18.9 E.	14 2.6 E.	7 5.3 S.	Dec. 4 7.0 S.	29 0.0 S.	10 15.6 S.
22 7.4 E.	18 14.9 E.	11 5.0 E.	8 6.4 E.	Apr. 3 8.0 E.	15 23.0 E.
26 19.8 E.	23 3.1 E.	15 4.8 I.	12 6.0 I.	8 16.2 I.	21 6.0 I.
31 8.3 E.	27 15.5 E.	19 4.6 W.	16 5.5 W.	14 0.3 W.	26 12.9 W.
Apr. 4 20.8 E.	1887	23 4.4 S.	20 5.0 S.	19 8.4 S.	31 19.8 S.
9 9.3 E.	Jan. 1 3.8 E.	27 4.5 E.	24 4.5 E.	24 16.5 E.	1887
13 21.7 E.	5 16.1 E.	31 4.6 I.	28 3.8 I.	30 0.5 I.	Jan. 6 2.8 E.
18 10.2 E.		Apr. 4 4.6 W.	32 3.0 W.	May 5 8.5 W.	

JAPETUS						
Inferior Conjunction .	January 1	March 22	June 11	September 1	November 20
West Elongation . .	January 20	April 11	July 2	September 21	December 10
Superior Conjunction .	February 10	May 1	July 23	October 11	December 29
East Elongation . .	March 2	May 22	August 12	October 31	

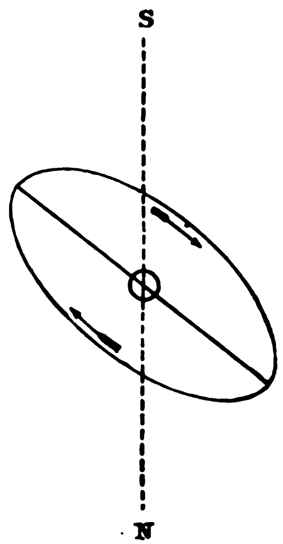
THE APPARENT ELEMENTS OF SATURN'S RINGS.

Greenwich Mean Noon.	a Outer Major Axis.	b Outer Minor Axis.	p Inclination of Northern Semi-Minor Axis to Circle of Declination from North to East.	l The Elevation of the Earth above the Plane of the Ring.	l' The Elevation of the Sun above the Plane of the Ring.	u Earth's Longitude from Saturn counted on Plane of Ring from the Ring's Ascending Node on Equator.	u' Ecliptic.
	″	″	° ′	° ′	° ′	° ′	° ′
Jan. 0	46.61	20.49	− 6 39.0	− 26 4.6	− 26 4.6	151 4.6	106 26.4
20	46.13	20.51	6 32.6	26 23.7	25 59.5	149 23.6	106 45.5
Feb. 9	44.95	20.12	6 27.8	26 35.5	25 54.0	148 11.2	105 33.2
Mar. 1	43.46	19.53	6 25.9	26 42.2	25 48.1	147 42.8	105 4.9
21	41.88	18.84	6 27.5	26 43.3	25 42.0	148 3.6	105 25.7
Apr. 10	40.40	18.09	− 6 32.4	− 26 36.5	− 25 35.7	149 11.3	106 23.5
30	39.15	17.45	6 39.5	26 27.9	25 29.2	150 58.6	108 20.9
May 20	38.21	16.86	6 47.9	26 10.6	25 22.2	153 15.8	110 38.2
June 9	37.60	16.36	6 56.6	25 47.6	25 15.1	155 52.8	113 15.3
29	37.35	15.97	7 4.1	25 19.0	25 7.8	158 39.7	116 2.3
July 19	37.43	15.69	− 7 11.6	− 24 46.8	− 25 0.0	161 27.3	118 49.9
Aug. 8	37.87	15.53	7 17.0	24 13.1	24 52.0	164 6.4	121 27.1
28	38.67	15.51	7 21.0	23 39.8	24 43.9	166 28.4	123 51.2
Sept. 17	39.77	15.66	7 23.6	23 11.5	24 35.4	168 24.4	125 47.3
Oct. 7	41.14	15.98	7 25.0	22 51.0	24 26.6	169 46.2	127 9.2
27	42.69	16.46	− 7 25.7	− 22 40.9	− 24 17.5	170 26.2	127 49.2
Nov. 16	44.23	17.09	7 25.7	22 43.9	24 8.3	170 20.6	127 43.7
Dec. 6	45.53	17.78	7 25.0	22 59.5	23 59.0	169 30.2	126 53.4
26	46.[illegible]5	18.41	7 23.5	23 24.3	23 49.3	168 5.0	125 28.3
31	46.45	18.54	− 7 23.0	− 23 31.3	− 23 46.9	167 40.6	125 4.0

The factor to be multiplied by a and b to obtain the axes of—

The inner ellipse of the outer ring = 0.8801 log factor = 9.9445
The outer ellipse of the inner ring = 0.8599 log factor = 9.9344
The inner ellipse of the inner ring = 0.6650 log factor = 9.8228
The inner ellipse of the dusky ring = 0.5486 log factor = 9.7392

NOTE.—The negative sign of l indicates that the visible surface of the ring is the southern one.



Date.	Position Angle.	Apparent Distance.
	°	"
Jan.	231.0	16.8
Sept.	233.0	16.5
Nov.	232.5	17.0

APPARENT ORBIT OF THE SATELLITE OF NEPTUNE IN 1886,
AS SEEN IN AN INVERTING TELESCOPE.

WASHINGTON MEAN TIMES OF ELONGATIONS.

uth West.			North East.			South West.			North East.			South West.			North East.		
	d	h		d	h		d	h		d	h		d	h		d	h
			Jan.	0	11.0	Aug.	26	10.5	Aug.	29	9.1	Oct.	30	1.9	Nov.	2	0.5
.	3	9.4		6	8.0	Sept.	1	7.5	Sept.	4	6.1	Nov.	4	22.9		7	21.6
	9	6.4		12	5.0		7	4.5		10	3.1		10	20.0		13	18.6
	15	3.5		18	2.1		13	1.6		16	0.2		16	17.0		19	15.6
	21	0.5		23	23.1		18	22.6		21	21.2		22	14.1		25	12.7
	26	21.6		29	20.2		24	19.7		27	18.3		28	11.1	Dec.	1	9.7
.	1	18.7	Feb.	4	17.2		30	16.7	Oct.	3	15.3	Dec.	4	8.1		7	6.8
	7	15.7		10	14.3	Oct.	6	13.8		9	12.4		10	5.2		13	3.8
	13	12.8		16	11.3		12	10.8		15	9.4		16	2.2		19	0.9
	19	9.8		22	8.4		18	7.9		21	6.5		21	23.3		24	21.9
	25	6.9		28	5.5		24	4.9		27	3.5		27	20.3		30	19.0

The above times are those of each passage of the satellite through an apsis of its apparent oit. The position of the satellite at any other time may be found by measuring around the oit from the apsis last passed through, remembering that the radius vector of the satellite scribes equal areas in equal times.

Period of the satellite of Neptune, $5^{d}\ 21^{h}.045$.

n the above diagrams, the central circle represents the planet, and is on the same scale the orbits.

WASHINGTON MEAN TIME.

PLANETARY CONSTELLATIONS.

	d	h	m		° ′
Jan.	2	13	46	☌ ☿ ☽ . . . . ☿ —	2 34
	2	14	-	♂ greatest Hel. Lat. N.	
	3	4	-	♀ in ☊	
	7	19	-	☿ greatest elong. W.	23 26
	8	13	5	☌ ♀ ☽ . . . . ♀ —	0 38
	9	17	-	☌ ♄ μ Geminorum ♄	0 0
	12	19	-	♅ Stationary.	
	13	-	-	♀ greatest brilliancy.	
	14	23	36	☌ ♆ ☽ . . . . ♆ +	2 58
	17	19	59	☌ ♄ ☽ . . . . ♄ +	4 8
	19	9	-	☿ in ☋	
	19	15	-	♃ Stationary.	
	23	8	43	☌ ♂ ☽ . . . . ♂ +	2 56
	23	20	-	☌ ♅ ♃ . . . . ♅ S.E.	1 51
	24	0	48	☌ ♃ ☽ . . . . ♃ —	0 17
	24	3	5	☌ ♅ ☽ . . . . ♅ —	1 9
	25	8	-	♂ Stationary.	
	27	19	-	♀ Stationary.	
	28	19	-	♆ Stationary.	
	29	18	-	☿ in Aphelion.	
Feb.	2	3	7	☌ ☿ ☽ . . . . ☿ —	5 24
	5	1	28	☌ ♀ ☽ . . . . ♀ +	6 0
	5	17	-	♀ in Perihelion.	
	6	6	-	♂ in Aphelion.	
	10	16	-	□ ♆ ☉	
	11	7	12	☌ ♆ ☽ . . . . ♆ +	3 10
	14	3	51	☌ ♄ ☽ . . . . ♄ +	4 21
	18	2	-	☌ ♀ ☉ Inferior.	
	18	11	-	☌ ☿ ♀ . . . . ☿ —	11 23
	18	22	-	☿ greatest Hel. Lat. S.	
	19	13	12	☌ ♂ ☽ . . . . ♂ +	3 50
	20	8	29	☌ ♃ ☽ . . . . ♃ —	0 8
	20	12	2	☌ ♅ ☽ . . . . ♅ —	1 11
	23	22	-	☌ ☿ ☉ Superior.	
	27	16	-	♀ greatest Hel. Lat. N.	
Mar.	2	13	-	♄ Stationary.	
	3	4	57	☌ ♀ ☽ . . . . ♀ +	6 11
	5	-	-	☉ eclipsed, vis. at Wash.	
	5	19	-	☍ ♂ ☉	
	6	0	44	☌ ☿ ☽ . . . . ☿ +	0 8
	9	20	-	♀ Stationary.	
	9	23	-	☿ in ☊	
	10	13	41	☌ ♆ ☽ . . . . ♆ +	3 15
	13	11	10	☌ ♄ ☽ . . . . ♄ +	4 27
	14	13	-	☿ in Perihelion.	
	18	8	23	☌ ♂ ☽ . . . . ♂ +	4 27
	19	14	31	☌ ♃ ☽ . . . . ♃ +	0 13
	19	21	19	☌ ♅ ☽ . . . . ♅ —	1 15
	19	23	-	☉ enters ♈, Spring com.	
	21	1	-	☍ ♃ ☉	
	21	10	-	☿ greatest elong. E.	18 40
	21	20	-	□ ♄ ☉	

	d	h	m		°
Mar.	24	21	-	☿ greatest Hel. Lat. N.	
	25	17	-	☍ ♅ ☉	
	26	-	-	♀ greatest brilliancy.	
	29	13	-	☿ Stationary.	
	31	2	30	☌ ♀ ☽ . . . . ♀ +	1
Apr.	4	6	51	☌ ☿ ☽ . . . . ☿ +	6
	6	20	37	☌ ♆ ☽ . . . . ♆ +	3
	8	11	-	☌ ☿ ☉ Inferior.	
	9	18	56	☌ ♄ ☽ . . . . ♄ +	4
	14	7	57	☌ ♂ ☽ . . . . ♂ +	3
	15	18	47	☌ ♃ ☽ . . . . ♃ +	
	16	5	-	♂ Stationary.	
	16	5	8	☌ ♅ ☽ . . . . ♅ —	
	18	4	-	☿ in ☋	
	22	11	-	☿ Stationary.	
	24	17	-	♀ in ☋	
	27	13	-	☿ in Aphelion.	
	29	12	7	☌ ♀ ☽ . . . . ♀ +	
	29	14	-	♀ greatest elong. W.	4
May	1	7	36	☌ ☿ ☽ . . . . ☿ —	
	4	5	20	☌ ♆ ☽ . . . . ♆ +	
	6	21	-	☿ greatest elong. W.	
	7	4	43	☌ ♄ ☽ . . . . ♄ +	
	11	19	12	☌ ♂ ☽ . . . . ♂ +	
	12	22	38	☌ ♃ ☽ . . . . ♃ +	
	13	10	54	☌ ♅ ☽ . . . . ♅ —	
	15	13	-	☌ ♆ ☉	
	17	21	-	☿ greatest Hel. Lat. S	
	23	8	-	♃ Stationary.	
	28	20	-	♀ in Aphelion.	
	29	8	9	☌ ♀ ☽ . . . . ♀ +	
	30	13	-	☌ ♆ ☿ . . . . ♆ —	
	31	15	49	☌ ♆ ☽ . . . . ♆ +	
	31	20	17	☌ ☿ ☽ . . . . ☿ +	
June	3	16	33	☌ ♄ ☽ . . . . ♄ +	
	5	22	-	☿ in ☊	
	8	16	8	☌ ♂ ☽ . . . . ♂ +	
	9	4	22	☌ ♃ ☽ . . . . ♃ +	
	9	15	43	☌ ♅ ☽ . . . . ♅ —	
	9	19	-	♅ Stationary.	
	10	12	-	□ ♂ ☉	
	10	12	-	☿ in Perihelion.	
	11	10	-	☌ ☿ ☉ Superior.	
	17	17	-	□ ♃ ☉	
	20	8	-	☌ ☿ ♄ . . . . ☿ +	
	20	16	-	♀ greatest Hel. Lat. S.	
	20	20	-	☉ enters ♋, Summer	
	20	21	-	☿ greatest Hel. Lat. N	
	22	7	-	☌ ♂ β Virginis . ♂ —	
	24	16	-	□ ♅ ☉	
	26	14	-	☌ ♆ ♀ . . . . ♆ +	
	27	17	-	☌ ♂ ♃ . . . . ♂ —	

WASHINGTON MEAN TIME.

PLANETARY CONSTELLATIONS.

	d	h	m			° ′
une	28	3	3	☌ ♆ ☽	....	♆ + 3 21
	28	6	27	☌ ♀ ☽	....	♀ + 2 57
uly	1	8	29	☌ ♄ ☽	....	♄ + 3 51
	2	0	-	☉	in Apogee.	
	2	19	54	☌ ☿ ☽	....	☿ + 4 35
	3	9	-	☌ ♄ ☉		
	6	13	56	☌ ♃ ☽	....	♃ − 0 33
	6	20	3	☌ ♂ ☽	....	♂ − 2 1
	6	21	45	☌ ♅ ☽	....	♅ − 1 34
	7	3	-	♃	greatest Hel. Lat. N.	
	8	21	-	☌ ♅ ♂	....	♅ + 0 34
	14	7	-	☿	in ☋	
	18	19	-	☿	greatest elong. E.	26 54
	19	3	-	♂	in ☋	
	24	12	-	☿	in Aphelion.	
	25	13	29	☌ ♆ ☽	....	♆ + 3 31
	28	5	-	☌ ♀	μ Geminorum	♀ − 0 5
	28	5	24	☌ ♀ ☽	....	♀ + 3 46
	29	0	47	☌ ♄ ☽	....	♄ + 3 45
	31	22	56	☌ ☿ ☽	....	☿ − 3 5
ug.	2	0	-	☿	Stationary.	
	3	3	57	☌ ♃ ☽	....	♃ − 1 8
	3	6	39	☌ ♅ ☽	....	♅ − 1 50
	4	5	40	☌ ♂ ☽	....	♂ − 3 57
	7	22	-	☌ ♀ ♄	....	♀ − 0 1
	13	20	-	☿	greatest Hel. Lat. S.	
	15	15	-	☌ ☿ ☉	Inferior.	
	15	21	-	♀	in ☊	
	16	0	-	☌ ♅ ♃	....	♅ − 0 32
	20	6	-	□ ♆ ☉		
	21	21	51	☌ ♆ ☽	....	♆ + 3 35
	23	3	-	♃	in Aphelion.	
	25	11	-	☿	Stationary.	
	25	16	23	☌ ♄ ☽	....	♄ + 3 39
	27	3	21	☌ ♀ ☽	....	♀ + 3 10
	27	16	9	☌ ☿ ☽	....	☿ + 0 14
	28	19	-	♆	Stationary.	
	28	-	-	☉	eclipsed, vis. at Wash.	
	30	18	32	☌ ♅ ☽	....	♅ − 2 0
	30	21	45	☌ ♃ ☽	....	♃ − 1 41
ept.	1	16	-	☿	greatest elong. W.	18 5
	1	20	-	☿	in ☊	
	1	20	34	☌ ♂ ☽	....	♂ − 5 26
	6	11	-	☿	in Perihelion.	
	11	2	-	☌ ♀	α Leonis . .	♀ + 0 38
	16	20	-	☿	greatest Hel. Lat. N.	
	18	3	50	☌ ♆ ☽	....	♆ + 3 31
	18	4	-	♀	in Perihelion.	
	22	5	19	☌ ♄ ☽	....	♄ + 3 29
	22	10	-	☉	enters ♎, Autumn com.	
	25	23	25	☌ ♀ ☽	....	♀ + 0 34
	27	3	0	☌ ☿ ☽	....	☿ − 1 6

	d	h	m			° ′
Sept.	27	8	0	☌ ♅ ☽	....	♅ − 2 8
	27	11	-	☌ ☿ ☉	Superior.	
	27	17	39	☌ ♃ ☽	....	♃ − 2 9
	29	1	-	☌ ♅ ☿	....	♅ − 0 34
	30	16	-	☌ ♅ ☉		
	30	16	32	☌ ♂ ☽	....	♂ − 6 11
Oct.	3	9	-	☌ ☿ ♃	....	☿ − 0 22
	9	0	-	☌ ♃ ☉		
	10	7	-	☿	in ☋	
	10	8	-	♀	greatest Hel. Lat. N.	
	13	18	-	☌ ♅ ♀	....	♅ − 0 52
	14	22	-	□ ♄ ☉		
	15	8	36	☌ ♆ ☽	....	♆ + 3 24
	19	14	7	☌ ♄ ☽	....	♄ + 3 16
	20	11	-	☿	in Aphelion.	
	22	4	-	☌ ♀ ♃	....	♀ + 0 18
	24	20	57	☌ ♅ ☽	....	♅ − 2 18
	25	13	39	☌ ♃ ☽	....	♃ − 2 35
	25	19	50	☌ ♀ ☽	....	♀ − 2 36
	27	19	41	☌ ☿ ☽	....	☿ − 7 4
	29	17	1	☌ ♂ ☽	....	♂ − 6 6
Nov.	3	13	-	♄	Stationary.	
	9	20	-	☿	greatest Hel. Lat. S.	
	11	13	58	☌ ♆ ☽	....	♆ + 3 17
	13	7	-	☿	greatest elong. E.	22 38
	15	19	30	☌ ♄ ☽	....	♄ + 3 3
	18	2	-	☍ ♆ ☉		
	21	7	16	☌ ♅ ☽	....	♅ − 2 33
	22	7	37	☌ ♃ ☽	....	♃ − 3 1
	22	15	-	☿	Stationary.	
	24	20	53	☌ ♀ ☽	....	♀ − 4 41
	26	3	56	☌ ☿ ☽	....	☿ − 5 40
	27	20	40	☌ ♂ ☽	....	♂ − 5 8
	28	21	-	☿	in ☊	
Dec.	2	11	-	☌ ♀ ☉	Superior.	
	2	19	-	☌ ☿ ☉	Inferior.	
	2	20	-	☌ ☿ ♀	....	☿ + 1 14
	3	11	-	☿	in Perihelion.	
	5	10	-	♀	in ☋	
	8	21	5	☌ ♆ ☽	....	♆ + 3 20
	12	13	-	☿	Stationary.	
	12	23	50	☌ ♄ ☽	....	♄ + 2 59
	13	19	-	☿	greatest Hel. Lat. N.	
	18	14	37	☌ ♅ ☽	....	♅ − 2 52
	19	22	21	☌ ♃ ☽	....	♃ − 3 24
	21	4	-	☉	enters ♑, Winter com.	
	22	14	-	☿	greatest elong. W.	22 6
	22	20	45	☌ ☿ ☽	....	☿ − 3 5
	22	22	-	♂	greatest Hel. Lat. S.	
	25	4	30	☌ ♀ ☽	....	♀ − 4 30
	27	1	36	☌ ♂ ☽	....	♂ − 3 29

ON THE ARRANGEMENT AND USE OF THE AMERICAN EPHEMERIS AND NAUTICAL ALMANAC.

PART I—THE EPHEMERIS FOR THE MERIDIAN OF GREENWICH.

THE greater portion of this Ephemeris, embracing the positions of the sun and moon; the distances of the moon from the centres of the sun and the four most conspicuous planets, and from certain fixed stars; the ephemerides of the planets Mercury, Venus, Mars, Jupiter, and Saturn, is designed for the special use of navigators. The remainder contains the ephemeris of Uranus and Neptune, the heliocentric co-ordinates of the seven major planets, the rectangular equatorial co-ordinates of the sun, the moon's longitude and latitude, data for the libration of the moon, the obliquity of the ecliptic, the equation of equinoxes, etc.

TIME.

Astronomers make use of several different kinds of time: mean solar time; true, or apparent solar time; and sidereal time.

Solar Time.—Solar time is that used for all the purposes of ordinary life, and is measured by the daily motion of the sun. A *Solar Day* is the interval of time between two successive transits of the sun over the same meridian; and the hour-angle of the sun is called *Solar Time.* This is the most natural and direct measure of time. But the intervals between the successive returns of the sun to the same meridian are not exactly equal, owing to the varying motion of the earth around the sun, and to the obliquity of the ecliptic. The intervals between the sun's transits over the meridian being unequal, it is impossible to regulate a clock or chronometer so that it shall accurately follow the sun.

To avoid the irregularity which would arise from using the true sun as the measure of time, a fictitious sun, called the *Mean Sun*, is supposed to move in the equator with a uniform velocity. This mean sun is supposed to keep, on the average, as near the real sun as is consistent with perfect uniformity of motion; it is sometimes in advance of it, and sometimes behind it, the greatest deviation being about 16 minutes of time.

Mean Solar Time, which is perfectly equable in its increase, is measured by the motion of this mean sun. The clocks in ordinary use and the chronometers used by navigators are regulated to mean solar time.

True, or *Apparent Solar Time* is measured by the motion of the real sun.

The difference between apparent and mean time is called the *Equation of Time*. By means of it we change apparent to mean time, or the reverse. Thus, if the apparent time be given, the mean time corresponding to it will be obtained by adding or subtracting the equation of time, according to the precept at the head of the column in which it is found, on page I of the Calendar for each month. If the mean time be given, the apparent time is obtained by applying the equation of time as directed by the precept on page II of the Calendar.

Sidereal Time.—Sidereal time is measured by the daily motion of the stars; or, as it is used by astronomers, by the daily motion of that point in the equator from which the true right ascensions of the stars are counted. This point is the vernal equinox, and its hour-angle is called *Sidereal Time.* Astronomical clocks, regulated to sidereal time, are called sidereal clocks.

A *Sidereal Day* is the interval of time between the transit of the vernal equinox over any meridian, and its next succeeding return to the same meridian. It is about $3^m 56^s$ shorter than the mean solar day; 365¼ solar days, or a year, being divided into 366¼ sidereal days. It is divided into 24 hours. The sidereal hours are counted from 0 to 24, commencing with the instant of the passage of the true vernal equinox over the upper meridian, and ending with its return to the same meridian. About March 21st of each year the sidereal clock agrees with the mean time, or ordinary clock; and the former gains on the latter about $3^m 56^s$ per day, so that at the end of a year it will have gained an entire day, and will again agree with the mean time clock.

Day.—The *Civil Day*, according to the customs of society, commences at midnight, and comprises twenty-four hours from one midnight to the next following. The hours are counted from 0 to 12 from midnight to noon, after which they are again reckoned from 0 to 12 from noon to midnight. Thus the day is divided into two periods of 12 hours each; of which the first is marked A. M., and the last is marked P. M.

The *Astronomical Day* commences at noon on the civil day of the same date. It also comprises twenty-four hours; but they are reckoned from 0 to 24, and from the noon of one day to that of the next following. The astronomical as well as the civil time may be either apparent or mean, according as it is reckoned from apparent noon or from mean noon.

The civil day begins twelve hours before the astronomical day; therefore the first period of the civil day answers to the last part of the preceding astronomical day, and the last period of the civil day corresponds to the first part of the same astronomical day. Thus, January 9th, 2 o'clock, A. M., civil time, is January 8th, 14^h, astronomical time; and January 9th, 2 o'clock, P. M., civil time, is also January 9th, 2^h, astronomical time. The rule, then, for the transformation of civil time into astronomical time is this:—*If the civil time is marked A. M., take one from the day and add twelve to the hours, and the result is the astronomical time wanted; if the civil time is marked P. M., take away the designation P. M., and the astronomical time is had without further change.*

To change astronomical to civil time, we simply write P. M. after it, if it is less than 12 hours. If greater than 12 hours, we subtract 12 hours from it, add 1 to the days, and write A. M. For example, January 3d, 23 hours, astronomical time, is January 4th, 11 o'clock, A. M., civil time.

If the longitude from Greenwich be expressed in time, and, when *west*, *added* to the local time, or, when *east*, *subtracted* from the local time, the result is the corresponding Greenwich time. If the local mean time is used, the result is the Greenwich mean time, which ordinarily is that required for the use of this Ephemeris. The rule is the same, whether we use mean or sidereal time.

THE CALENDAR.

The Calendar is divided into twelve months; and to each month are assigned eighteen pages, the contents of which are as follow:—

Page I contains, for Greenwich apparent noon of each day, *The Sun's Apparent Right Ascension*, and *Declination*, and the *Equation of Time*. Adjoining columns contain the differences of these quantities for one hour. By multiplying this difference by the hours and parts of an hour from Greenwich apparent noon, and adding the amount to, or subtracting it from, the quantity at noon, according as that quantity is increasing or decreasing, we obtain the value of any quantity for any given Greenwich apparent time. The hourly differences are given for the instant of apparent noon at Greenwich, and, when greater accuracy is required, should be first interpolated for half the hours and parts of an hour of the Greenwich apparent time.

This page is chiefly used when the sun is observed on the meridian, and the local apparent time is $0^h 0^m 0^s$. The longitude from Greenwich expressed in time, if west, is at that instant the Greenwich apparent time, or time after Greenwich apparent noon; if east, it is time before

Greenwich apparent noon. The longitude of any place is therefore employed in reducing the quantities on this page to apparent noon at the place.

The right ascension of the sun thus reduced is the sidereal time of local apparent noon. The difference between it and the clock time of the meridian passage of the sun is the error of the clock on sidereal time.

The declination of the sun reduced to the meridian, or apparent noon, of the place, is required in finding the latitude from a meridian altitude of the sun.

As an example of the use of page I:—

Let the sun's declination be required at apparent noon, 1886, May 30, at a place whose longitude is 180° 20′, or $12^h\ 1^m\ 20^s$ west from Greenwich.

		h	m	s
Local apparent time	May 30,	0	0	0
Longitude from Greenwich (additive)		12	1	20
Greenwich apparent time	May 30,	12	1	20

Reducing the minutes and seconds to decimals of an hour, we find that this moment is $12^h.022$ after Greenwich apparent noon on May 30, or $11^h.978$ before Greenwich apparent noon on May 31.

On page 74 of the Ephemeris we find that the change of declination in one hour is

May 30, at Greenwich apparent noon	22″.14
May 31, at Greenwich apparent noon	21.19
Difference for one day	0.95

If we want to be very exact, we find the amount of this hourly difference for the time which is half way between Greenwich noon and the time of observation; that is, for 6 hours after Greenwich noon of the 30th, this being half of 12 hours. Six hours is 0.25 of a day; so the calculation is as follow:—

Difference for one hour, May 30	22″.14
Change for one day (or 0″.95) × 0.25 . . .	0.24
Difference at 6 hours after noon	21.90

$$21''.90 \times 12.022 = 263''.3 = 4'\ 23''.3$$

Declination at Greenwich noon, May 30 . . .	N. 21° 48′ 6″.6
Change in 12.022 hours (additive) . . .	4 23.3
Sun's declination at time of observation . .	N. 21 52 29.9

When the time of observation is only a few hours before Greenwich noon, it may be better to count the longitude backward from this nearest noon. Thus, in the example just given, the time is $11^h.978$ before Greenwich noon of May 31; half this interval is about 0.25 of a day, and the hourly motion for the middle of the interval is 21″.43. Then, we find:—

Declination at Greenwich noon, May 31 . .	N. 21° 56′ 46″.6
Product of 21″.43 × 11.978 = 256″.7 (subtractive) .	4 16.7
Sun's declination at time of observation . .	N. 21 52 29.9

It will always be well to make the calculation by both methods, as their agreement will show both to be right.

At sea it is ordinarily sufficient to have the declination to the nearest half minute; and the reduction may be found by Table V of Bowditch's *American Practical Navigator*.

The equation of time, as has been before explained, is the number of minutes and seconds to be added to or subtracted from the apparent time, or the time given by an observation of the sun, to obtain the mean time. The heading of the column directs the manner in which the equation is to be applied. When there is a change in the course of the month from addition to subtraction or the reverse (as in the months of April and June), the two different directions are separated by a line, while a corresponding line below points out the dates between which the change takes place. The equation of time, as given on page I, is the mean time of apparent noon, or the hour-angle of the mean sun at that instant.

The Sun's Semidiameter, and the *Sidereal Time of Semidiameter Passing Meridian* are also given on page I. The sun's semidiameter is used in reducing the altitude of the upper or lower limb of the sun to the altitude of the centre; and in reducing the angular distance of the limb from the moon or some other object, to the distance from the centre of the sun. The sidereal time of semidiameter passing the meridian is employed in obtaining the passage of the sun's centre over the wires of a transit-instrument, when the passage of one limb only has been observed. The quantity found in this column is to be added to the time of transit of the first, or western, limb; and to be subtracted from the time of transit of the second, or eastern, limb.

Page II contains, for Greenwich mean noon of each day, *The Sun's Apparent Right Ascension*, and *Declination*, the *Equation of Time*, and the *Sidereal Time of Mean Noon*. The hourly changes of these quantities are also given, and may be used in reducing them to any Greenwich mean time. The hourly changes may be first interpolated for half the Greenwich time, when great precision is required, in the way described in explaining the calculation of the declination.

The right ascension and declination on pages I and II are affected by aberration, and therefore denote the apparent position of the true sun. Page II is more conveniently used when the mean time is known. This is the case in most observations of the sun out of the meridian, when the times have been noted by a clock or chronometer regulated to mean time. The quantities on this page can be reduced to mean noon of any place by interpolating for the longitude, as in the example of the sun's declination on the preceding page.

The sun's declination is required for finding the latitude of the place, the local time, and the sun's azimuth and amplitude, from observations of the sun.

The equation of time is needed in finding the mean time from observations of the sun, and the latitude from observations out of the meridian. The heading of the column directs the manner in which it is to be applied to mean time to obtain the apparent time.

The equation of time, as given on page II, is the apparent time of mean noon; and is equivalent to the hour-angle of the true sun at the instant of mean noon.

The sidereal time of mean noon is also the right ascension of the mean sun at Greeewich mean noon. It may be reduced for the longitude, or to any Greenwich mean time, by using the hourly difference, $9^s.8565$; or by Table III, appended to this volume, for reducing intervals of mean solar to sidereal time. Table LI of BOWDITCH's *Navigator* may be used for the same purpose when only the nearest quarter of a second is required.

The sun's right ascension and the sidereal time of mean noon, or right ascension of the mean sun, are useful in converting mean time to sidereal time. We first find the Greenwich mean time, then the R. A. of the mean sun for this time, as last explained: this being added to the local mean time will give the sidereal time.

The sidereal time of mean noon, reduced for the longitude of the place, is also used in converting sidereal time to mean time. Subtracting the reduced value from the given sidereal time, gives the interval of sidereal time from noon. Subtracting from this the corresponding reduction of a sidereal interval to a mean time interval, in Table II, appended to this volume, or Table LII of BOWDITCH's *Navigator*, will give the mean time required. This reduction may also be found by multiplying $9^s.8296$ by the hours and parts of an hour of the given sidereal time.

As examples of the use of page II:—

1.—Let the sun's right ascension and the equation of time be required for 1886, May 15, $9^h\ 2^m\ 30^s$, A. M., mean time, at a place whose longitude is 100° 10′, or $6^h\ 40^m\ 40^s$, west of Greenwich.

		h m s
Local astronomical mean time	May 14,	21 2 30
Longitude from Greenwich (additive)		6 40 40
Greenwich mean time	May 15,	3 43 10 = $3^h.7194$

Sun's Right Ascension.	h m s	*Equation of Time.*	m s
May 15, Greenwich noon .	3 28 41.46	May 15, noon . .	3 51.37 (additive)
H. D. 9s.873 × 3.7194 . .	+ 0 36.72	H. D. — 0s.017 × 3.72 .	— 0.06
	3 29 18.18		3 51.31

In this case, the hourly differences interpolated to half the interval, or 1h.9 after noon, have been used. The equation of time in this example is additive to mean time. Its reduction could also have been found by Table VI, A., of BOWDITCH's *Navigator*, but to seconds only.

2.—If the sidereal time is required for the same date and time, we have:—

	h m s
May 15, Sidereal Time (at Greenwich mean noon)	3 32 32.84
Hourly Difference 9s.8565 × 3.7194	+ 0 36.66
Add the local astronomical mean time	21 2 30.00
The required sidereal time is (rejecting 24h) . . .	0 35 39.50

The reduction 0m 36s.66 could have been found in Table III corresponding to the Greenwich mean time 3h 43m 10s. Also, by Table LI of BOWDITCH's *Navigator*, the reduction is 0m 36s.7.

3.—On 1886, May 15, A. M., at a place whose longitude is 109° 10′ W., suppose the sidereal time to be 0h 36m 37s.16, and that the corresponding mean time is required.

The astronomical day is May 14; the longitude in time, + 6h 40m 40s, or + 6h.678.

	h m s
May 14, Sidereal Time (at Greenwich mean noon)	3 28 36.28
The H. D. 9s.8565 × 6.678, or the reduction for 6h 40m 40s in Table III .	+ 1 5.82
The sidereal time of local mean noon	3 29 42.10
The given sidereal time (+ 24h, if necessary for the following subtraction)	24 36 37.16
Subtracting the first from the second gives the sidereal interval from noon .	21 6 55.06 = 21h.11529
— 9s.8296 × 21.11529, or the reduction for 21h 6m 55s.06 in Table II . .	— 3 27.55
The required astronomical mean time is . . May 14,	21 3 27.51

Page III contains, for Greenwich mean noon of each day, *The Sun's True Longitude* and *Latitude*, and the *Logarithm of the Radius Vector of the Earth*. The longitudes of the sun are the true longitudes, not corrected for aberration. The longitude is given in two columns, headed λ and λ'; λ representing the sun's longitude counted from the true equinox of the date; and λ', the same co-ordinate counted from the mean equinox of the beginning of the year, (January 0d.0). A column of hourly differences enables the computer to obtain the sun's longitude for any hour from noon. The hourly differences of the logarithm of the radius vector are likewise given. The latitude is referred to the ecliptic of the date.

The last column on page III contains the *Mean Time of Sidereal Noon;* that is, the number of hours, minutes and seconds after Greenwich mean noon when the first point of Aries passes the meridian of Greenwich. It may be reduced to any meridian by interpolating for the longitude, or to any Greenwich sidereal time by means of the hourly difference, — 9s.8296. The reduction, however, can be taken directly from Table II for reducing intervals of sidereal time to mean solar time; or, approximately, from Table LII BOWDITCH's *Navigator*.

This column may be used in converting sidereal time to mean time instead of that on page II. As an illustration, let us take Example 3, above:

It is seen in advance that the sum of the mean time of sidereal noon and the given sidereal time is less than 24 hours. Were it more than 24 hours, the mean time of sidereal noon should be taken out for May 13, that is the preceding astronomical day.

	h m s
May 14, the mean time of Greenwich sidereal noon is . .	20 28 1.98
The H. D. — 9s.8296 × 6.678, or the reduction for long., Table II	— 1 5.64
The mean time of local sidereal noon	20 26 56.34
Add the given sidereal time	0 36 37.16 = 0h.6103
The sum is	21 3 33.50
— 9s.8296 × 0.6103, or the reduction for 0h 36m 37s.2 in Table II .	— 0 6.00
The required astronomical mean time . May 14,	21 3 27.50

Page IV contains *The Moon's Semidiameter* and Equatorial *Horizontal Parallax*, for each mean noon and midnight at Greenwich. Columns adjoining those of the horizontal parallax give the change of this quantity in one hour, by means of which it can be reduced to any other Greenwich mean time, in the same way as the sun's declination and the equation of time in the preceding examples. The sign plus or minus prefixed to the hourly differences, shows whether the horizontal parallax is increasing or decreasing.

The reduction of the moon's semidiameter may be readily found by multiplying the reduction of the horizontal parallax by 0.272. It may also be obtained from Table XI of BOWDITCH's *Navigator*, or by simply computing the proportional part.

If, for example, the semidiameter of the moon is to be taken out for 1886, May 1, 10^h, P. M., Greenwich mean time, we see that the difference of the semidiameters at noon and midnight of May 1 is $4''.7$; then,

$$\text{as } 12^h : 10^h = 4''.7 : 3''.9,$$

which is the correction to be added to the semidiameter at noon, because the semidiameter is increasing. The moon's semidiameter then, for May 1, 10^h, is $15'\ 11''.1 + 0'\ 3''.9$, or $15'\ 15''.0$.

The moon's semidiameter and horizontal parallax are required for all observations of the moon. When great precision is needed, the hourly differences should be first interpolated for half the interval of Greenwich time from noon or midnight, and a correction applied to the horizontal parallax for the latitude of the place of observation.

The *Mean Time of the Moon's Upper Transit at Greenwich*, which is given on page IV to tenths of a minute, is also accompanied with a column of differences for one hour of longitude, by means of which, having the longitude turned into time, the local time of the moon's meridian passage at any other place may be computed. The reduction may be taken from BOWDITCH's Table XXVIII by simple inspection. The last column of this page contains the *Age* of the moon, or the time elapsed since the preceding new moon, to tenths of a day.

Pages V—XII contain *The Moon's Right Ascension*, and *Declination*, for each day and hour of Greenwich mean time. They are accompanied with columns of differences for one minute, which are also given at each hour. The Greenwich mean time, which is required for taking out these quantities, may be taken from a well-regulated chronometer, or obtained by applying the longitude, turned into time, to the local mean time of the observer. The right ascension, or declination, is taken out for the day and hour of the Greenwich mean time; the *Diff. for 1 Minute* multiplied by the minutes and parts of a minute of the Greenwich time; and the product added to, or subtracted from, the quantity, according as the quantity is increasing or decreasing.

Thus, suppose the moon's right ascension and declination are required for 1886, May 1, $10^h\ 10^m\ 30^s$, astronomical mean time at Greenwich:—

	Right Ascension.		*Declination.*
	h m s		° ′ ″
May 1, 10^h	0 57 26.59		N. 3 23 54.3
Diff. $2^s.0067 \times 10.500$	+ 21.07	$9''.918 \times 10.500$	+ 1 44.1
May 1, $10^h\ 10^m\ 30^s$	0 57 47.66		N. 3 25 38.4

The differences interpolated for $5^m.2 = 0^h.09$ are for the right ascension $2^s.0069$, and for the declination $9''.917$, which may be used for greater precision.

Page XII contains also the *Phases of the Moon* and the dates of the *Moon's Perigee and Apogee*, or least and greatest distances from the earth.

Pages XIII—XVIII contain the *Lunar Distances*, or the angular distances of the centre of the moon from the centre of the sun, and from the four larger planets and certain fixed stars, as they would appear to an observer at the centre of the earth. They are given for every third hour of Greenwich mean time, beginning at noon; the dates are therefore astronomical. All the distances that can be observed on the same day are grouped together under that date; and the columns are read from left to right, across both pages of the same opening. The letter W. or E. is affixed to the name of the sun, planet or star, to indicate that it is on the west, or east, side of the moon.

An observer on the earth's surface having measured a lunar distance, corrected it for errors of his instrument and for the semidiameter of the objects, and cleared it from the effects of refraction and parallax, finds the true, or geocentric, distance; that is, the distance as it would have appeared from the centre of the earth at the moment of observation. With this distance and the distances in the Ephemeris of the same bodies on the same day, the Greenwich mean time of the observation can be found.

To lessen the labor of computation, there is given in the Ephemeris, between every two successive distances, the logarithm of the seconds of time in which the distance changes 1″: or, as it is usually called, the *Proportional Logarithm of the Difference.* It is given for the middle instant of the two hours between which it is placed.

For computing the Greenwich time we have the following rule:—

Find in the Almanac the two distances between which the true distance falls; take out the nearest of these, the hours of Greenwich time over it, and the P. L. of Diff. between them.

Find the difference between the true distance and the distance taken from the Almanac; and from the proportional logarithm of this difference, as found in the Navigator, subtract the P. L. of Diff. taken from the Almanac.

The result is the proportional logarithm of an interval of time to be added to the hours of Greenwich time, taken from the Almanac, when the earlier Almanac-distance is used; to be subtracted from the hours of Greenwich time, when the later Almanac-distance is used.

Another method is, to add the common logarithm of the difference of the true and the Almanac-distances to the P. L. of Diff. of the Almanac; the sum will be the common logarithm of the correction to be applied to the hours of Greenwich time. The Table of *Logarithms of small Arcs in Space or Time,* given at the end of the volume for 1871, saves the operation of reducing degrees (or hours) and minutes to seconds, and the reverse.

As the P. L. of Diff. in the Ephemeris varies, the Greenwich time found by the methods just described may not be sufficiently exact. To correct it for such variation, or second difference, take the difference between the P. L. of Diff. used and the one which follows it in the Ephemeris, (or, more strictly, half the difference of the preceding and following ones). With this difference, and the first correction of the Greenwich time already found, enter Table I, appended to this volume, and take out the corresponding seconds, which are to be added to the approximate Greenwich time when the Prop. Logs. in the Ephemeris are decreasing; and subtracted when they are increasing.

Thus the Greenwich mean time of the observation can be obtained. If the observer has noted the time of observation by a chronometer, the difference of this chronometer-time and the Greenwich mean time will be the error of the chronometer on Greenwich time as found from the lunar distance. In this way lunar distances can be used as a check upon the chronometer. By a series of carefully observed lunar distances on both sides of the moon, the chronometer-error may generally be ascertained within 20 or 30 seconds.

If the observer has found the local mean time of observation from the observed altitude of one of the bodies, or by a watch regulated to that time by recent observations and corrected for change of longitude in the interval, the difference of this local time and the Greenwich time found from the lunar distance will be his longitude. A longitude derived by this method should always be considered as uncertain by 5′ or more.

As an example of finding the Greenwich mean time from a lunar distance, suppose that in 1886, Feb 10, about 6^h of Greenwich mean time, the corrected distance of the moon's centre from that of the sun is 74° 10′: —

Corrected distance	74° 10′ 0″		
Distance in the Ephemeris, Feb. 10, VI^h . .	73 35 25	P. L.	0.3082
Difference	0 34 35	P. L.	0.7164
		P. L.	0.4082
Time from VI^h (*after*)	$+1^h$ 10^m 19^s		
Corr. for 2d Diff., Table I	+ 4.5		
Greenwich mean time, Feb. 10 . . .	7 10 23.5		

By a table of common logarithms, or a table of logarithms of small arcs, the reduction of the Greenwich time would be found thus:—

From Ephemeris	P. L.	0.3082
Diff. of distances, $34' \, 35'' = 2075''$	log	3.3170
Red. of Greenwich time, $+1^h \, 10^m \, 19^s = 4219^s$	log	3.6252

The result is the same as by the previous method.

Pages 218—249 contain the geocentric ephemerides of the seven major planets. The positions are referred to the equator and true equinox of the date, and corrected for aberration; they are, therefore, apparent positions. All the data except meridian passage are given for the moment of Greenwich mean noon. The column *Meridian Passage* gives the hour, minute and tenth of that passage of the planet over the meridian of Greenwich which occurs next after the noon of the date.

The right ascension and declination of a planet are required whenever it has been observed for time, latitude or azimuth. The mode of reducing them to any instant of Greenwich mean time is the same as in the examples for the sun, previously given. The local mean time of passage across any other meridian can be found by dividing the daily differences by 24, and multiplying the quotient by the hours and fractions of the longitude of the place. The product is subtractive from the time of Greenwich passage when the place is east of Greenwich, and additive when west. The corrections can never exceed one-half the change for one day.

Pages 250—263 contain the heliocentric positions of the seven major planets, and the logarithms of their distances from the earth. The heliocentric longitude is reckoned, not from the true equinox, as in the preceding ephemerides, but from the mean equinox of the date. It is, therefore, necessary to apply nutation, if the longitude from the true equinox is required. The daily motion is given for the moment of Greenwich mean noon. The column *Reduction to Orbit* gives the correction to be applied to the heliocentric longitudes in order to obtain the longitude counted along the orbit of the planet. This longitude is equal to the distance of the node from the mean equinox, plus the distance of the planet from the node. The heliocentric latitude is counted from the moving plane of the ecliptic. The *Logarithm of Radius Vector* is the logarithm of the distance of the centre of the planet from that of the sun, at each Greenwich mean noon given in the first column. The two last columns give, in the same way, the logarithm of the true distance of the centre of the planet from that of the earth. The one column gives the quantity for the Greenwich noon indicated on the left hand side of the page, and the other for the noon which is midway between that date and the date next below it. In the case of Mercury, this intermediate date is mean noon of the day immediately following; in the case of Venus, Mars, Jupiter, and Saturn, it is mean noon of the second day following; and in the case of Uranus and Neptune, mean noon of the fourth day following.

Pages 264—271 contain the rectangular co-ordinates of the centre of the sun, referred to the centre of the earth as the origin, and to the true equator and equinox of each date as the circle and point of reference. Each co-ordinate is given first for Greenwich mean noon, and in the column following for mean midnight of the same day. The columns *Reduc. to Mean Eq'x of Jan.* 0 give the corrections to be applied to the co-ordinates for noon in order to obtain the corresponding co-ordinates referred to the mean equator and the mean equinox of January 0.

Pages 272—275 give the longitude and latitude of the moon for every Greenwich mean noon and midnight. Both quantities are referred to the true ecliptic and equinox of the date.

Pages 276 and 277 contain the position of the moon's equator and the mean longitude of the moon, and a table for computing the libration of the moon. The epochs of greatest libration of the moon, together with the formulæ for finding the libration in longitude and latitude are given on page 418.

Page 278 contains, for each tenth Greenwich mean noon, the values of the principal elements arising from the motion of the equinox, and also the aberration and parallax of the sun. The column *Apparent Obliquity of the Ecliptic* (HANSEN) gives the true inclination of the earth's

equator to the ecliptic, without correction for the terms depending on the moon's longitude. The *Equation of Equinoxes* is really the astronomical nutation; that given *In Longitude* is the correction to be applied to the longitude of the body referred to the mean equinox, in order to obtain that longitude as referred to the true equinox. When the correction is positive, the true longitudes are greater than those referred to the mean equinox; while the contrary is true when the correction has the negative sign. The equation *In R. A.* is equal to that in longitude, multiplied by the cosine of the obliquity of the ecliptic.

The next column gives the *Precession of Equinoxes in Longitude*, from January 0 to each of the dates following. *The Sun's Aberration* is the quantity which is to be applied to the true longitude of the sun in order to obtain its apparent longitude. The correction being negative shows that the apparent longitude as affected by aberration is always less than the true longitude. The sun's equatorial horizontal parallax, given in the next column, is the angle subtended by the radius of the earth's equator, as seen from the centre of the sun.

PART II—THE EPHEMERIS FOR THE MERIDIAN OF WASHINGTON.

Page 280 contains the formulæ for reducing the positions of the fixed stars, using the notation of Bessel, and the constants of Peters and Struve. The formulæ by which the star-numbers are computed are also given.

Pages 281—284 contain the logarithms of the *Besselian Star-Numbers*, A, B, C, D, for each Washington mean midnight. These numbers serve to reduce the mean place of a star at the beginning of the Besselian fictitious year to its apparent place at the dates for which the numbers are given. If used in accordance with the English and French notation, the pair of quantities A and B must be interchanged with the pair C and D; that is, A must be interchanged with C, and B with D. In the first column along with the solar day is given, for certain dates, the sidereal hour and tenth of midnight. The sidereal time for which any set of quantities is given can be found by interpolation from these numbers.

The following is an example of the reduction of a star to apparent place by the Besselian star-numbers: —

Computation of the apparent place of α *Aquilæ for* 1886, *July* 12, *for the upper transit at Washington.*

(Star-Catalogue)	log a	0.4611	log b	7.6484	log c	8.4753	log d	8.7813 n
(Page 283)	log A	9.6275	log B	0.9635	log C	0.8214	log D	1.2816 n
(Star-Catalogue)	log a'	0.9487	log b'	9.9525	log c'	9.7502	log d'	8.8197
	log Aa	0.0886	log Bb	8.6119	log Cc	9.2967	log Dd	0.0629
	log Aa'	0.5762	log Bb'	0.9160	log Cc'	0.5716	log Dd'	0.1013 n

Mean Place, 1886.0, (page 300)	$\alpha_0 =$	19ʰ 45ᵐ 13ˢ.277	$\delta_0 =$	+ 8° 34′ 4″.34
	$Aa =$	+ 1.226	$Aa' =$	+ 3.77
	$Bb =$	+ 0.041	$Bb' =$	+ 8.24
	$Cc =$	+ 0.198	$Cc' =$	+ 3.72
	$Dd =$	+ 1.156	$Dd' =$	− 1.26
	$E =$	− 0.001	$\tau\mu' =$	+ 0.20
	$\tau\mu =$	+ 0.019		
Apparent Place, 1886, *July* 12,	$\alpha =$	19 45 15.92	$\delta =$	+ 8 34 19.01

Pages 285—292 contain the *Independent Star-Numbers*, which can be used for the same purpose. The column τ gives the fraction of the year from the beginning of the fictitious year to each date. These quantities are connected with those of Bessel by the relations given on page 280, where are also found the formulæ and precepts for the application of both systems of numbers. In order to use the Besselian numbers, it is necessary to have the values of the star-constants, a, b, c, d, a', b', c', d'. The independent star-numbers, are given in order that the apparent place of the star may be determined when it is not convenient to compute these numbers.

The following is an example of the reduction of a star to apparent place by the independent star-numbers: —

Computation of the apparent place of α Aquilæ for 1886, July 12, for the upper transit at Washington.

$\alpha_0 = 19^h\ 45^m.2$ $\qquad\qquad \delta_0 = +\ 8^\circ\ 34'.1$

$G = 3^h\ 8^m.9$, $H = 10\ 43.7$ (Page 289) $\qquad G + \alpha_0 = 22^h\ 54^m.1$, $H + \alpha_0 = 6\ 28.9$

	$\log \frac{1}{15}$	8.8239	$\log \frac{1}{15}$	8.8239	$\alpha_0 =$	$19^h\ 45^m\ 13^s.277$
(Page 289)	$\log g$	1.0977	$\log h$	1.3063	$f =$	+ 1.302
	$\log \sin (G+\alpha_0)$	9.4527 *n*	$\log \sin (H+\alpha_0)$	9.9965	$(g) =$	− 0.036
	$\log \tan \delta_0$	9.1780	$\log \sec \delta_0$	0.0049	$(h). =$	+ 1.354
	$\log (g)$	8.5523 *n*	$\log (h)$	0.1316	$\tau\mu =$	+ 0.019
					Apparent Right Ascension =	19 45 15.92
(Page 289)	$\log g$	1.0977	$\log h$	1.3063		
	$\log \cos (G+\alpha_0)$	9.9818	$\log \cos (H+\alpha_0)$	9.0996 *n*	$\delta_0 =$	$+\ 8^\circ\ 34'\ 4''.34$
	$\log (g')$	1.0795	$\log \sin \delta_0$	9.1731	$(g') =$	+ 12.01
			$\log (h')$	9.5790 *n*	$(h') =$	− 0.38
	$\log i$	0.4584			$(i) =$	+ 2.84
	$\log \cos \delta_0$	9.9951			$\tau\mu' =$	+ 0.20
	$\log (i)$	0.4535				
					Apparent Declination =	+ 8 34 19.01

Pages 293—301 contain the mean places of three hundred and eighty-three stars, for the beginning of the fictitious year 1886, or the moment when the sun's mean longitude is 280°.

The annual variations are to be considered as the differential coefficients of each co-ordinate with respect to the time at the beginning of the year.

In order that the list of mean places of stars may serve the purpose of a working-catalogue for the convenient use of astronomers, the position of each of the northern circumpolar stars is given in duplicate, one position being for the upper and the other for the lower culmination. The positions for the lower culmination are marked S. P. In this case, the right ascensions are the sidereal times at which the star crosses the lower meridian; and, in order to have the expressions for the co-ordinates congruous in all cases, the declinations are counted from the equator through the north pole, and therefore exceed 90°. The time of observation and setting of the circle, in order to find a star on the meridian, are then obtained uniformly for all the stars.

Beginning with the volume for 1882, the number of stars has been greatly increased, in order to make the list more useful to field-astronomers. In order to show at a glance these additional stars, they are indicated in the list by an asterisk. *

Pages 302—313 contain the apparent positions of the four north polar stars, α, δ, and λ Ursæ Minoris, and 51 Cephei, for every upper transit at Washington. They include the terms depending on the moon's longitude. The mean solar time of transit is given in the column *Mean Solar Date*, in order that each transit above and below the pole may be readily identified. Suppose, for example, that the transit of Polaris below the pole on January 26th is to be found, and we wish to know whether it precedes or follows the upper transit of the same date. On page 302, we find that the upper transit occurs January 26.2; the lower transit, therefore, occurs January 26.7 But, the lower transit following that of July 1st (page 308), does not take place until July 2.3. Hence, the lower transit of July 1st precedes the upper one of the same date. A transit occurring very nearly at noon may also be identified without a computation to ascertain the actual mean date, by simply noting the tenth of a day in the column of *Mean Solar Date*.

Pages 314—364 contain, for every tenth upper transit at Washington, the apparent places of those stars of the preceding list which are not marked with an asterisk. The mean solar date in each left hand column gives the day and tenth of the transit; so that each intermediate transit

* A supplement to the Ephemeris for 1884, containing the apparent right ascensions of these additional stars for the years 1881—1884, has been issued.

may be readily identified. Along with each co-ordinate is given, in small type, the change for ten days. This quantity is to be regarded as the differential coefficient corresponding to the dates for which the star-places are given.

Pages 365—376 contain the apparent right ascensions of all stars marked with an asterisk in the list of mean places. The apparent right ascension of each star is given only for that part of the year when it may readily be observed on the meridian. In the case of circumpolar stars, the right ascensions for lower, as well as upper, transit are given.

Pages 377—384 contain the apparent right ascension, declination, and semidiamter of the sun, and the sidereal time, all for Washington mean noon. Adjoining columns give the seconds of right ascension and of declination for apparent noon, that is, for the moment of transit of the sun's centre over the meridian of Washington. The hours and minutes of right ascension, and the degrees and minutes of declination are the same for both mean and apparent noon. In case they would have differed, the minute which would have been numerically larger is diminished by one, and the seconds increased by sixty, so that there is always a correspondence between the two numbers. The hourly motions in right ascension and declination are given for the moment of mean noon, but may be regarded as having the same values for apparent noon.

The *Equation of Time for Apparent Noon* is the correction to be applied to apparent time in order to obtain mean time. It is, therefore, mean time minus apparent time. Each number as given is the mean time of transit of the sun's centre over the meridian of Washington, counted from the nearest noon. The use of all the quantities is substantially the same as in the *Ephemeris for the Meridian of Greenwich.*

Pages 385—392 contain the right ascension, declination, semidiameter, and parallax of the moon, at the moment of transit over the meridian of Washington. The mean time given in the second column is that of transit of the moon's centre over this meridian. The differences for one hour of longitude are the amounts by which the local mean times of transit over a meridian one hour west of Washington exceed those given in the column *Mean Time of Transit*, supposing the rate of change to be uniform and equal to what it is at the moment of transit over the meridian of Washington. The next four columns need no especial explanation, except that the differences for one hour of longitude are computed as if the motion of the moon in right ascension were uniform. By means of them, the position of the moon can be computed with astronomical accuracy at the moment of transit over any meridian not exceeding one hour in longitude from that of Washington, by taking account of second differences. With greater longitudes of the place, the accuracy of the result obtained in this way will diminish. The columns of sidereal time of semidiameter passing meridian, etc., do not seem to need any explanation, except that they all refer to the moment of transit. The column *Bright Limbs* is given to indicate to the observer which limbs are illuminated. When two opposite limbs are both so nearly full that they can be well observed, both are indicated; and the one which is deficient is printed in smaller type. When the illumination is so nearly equal that no choice can be made between them, both are printed in large type.

Pages 393—409 contain the geocentric apparent right ascensions and declinations of the seven major planets, and their semidiameters and horizontal parallaxes, for the moments of all those transits over the meridian of Washington which can be observed.

PART III—PHENOMENA.

This portion of *The American Ephemeris and Nautical Almanac* gives the principal astronomical phenomena of the year, reduced to Washington mean time, except in the case of the eclipses and the data for the rings of Saturn, which are given in Greenwich mean time.

Pages 412—416 inclusive contain the elements necessary for computing the two eclipses of the sun which occur during the year.

The eclipse-elements are given for the moment of conjunction of the sun and moon in right ascension. The subsequent tables and results are not, however, computed from these

elements unchanged; but from the accurate positions of the two bodies as interpolated for each hour of the eclipse. The principal circumstances of each eclipse are as follow:—

On the line "Eclipse begins" is given the Greenwich mean time at which the earth first touches the moon's penumbra, and the longitude and latitude of the point of touching.

The "Central eclipse begins" when the axis of the moon's shadow first touches the earth, and the longitude and latitude of the point of touching follow.

"Central eclipse at noon" indicates the moment when the axis of the shadow is coincident with the plane of the meridian at the point of its intersection with the earth's surface. To the observer at this point, the eclipse will be central at the moment of apparent noon.

"Central eclipse ends" and "Eclipse ends" have the converse meaning of the beginning.

Maps of the Eclipses.—The regions in which each eclipse is visible are shown upon the maps given in connection with them. From these maps may also be derived the approximate determination of the times of beginning and ending, and of the magnitude of the eclipses at any place. The dotted curves show the outlines of the shadow for each hour of Greenwich mean time and therefore pass through all the places where the eclipse begins or ends at that hour. To find at what hour the eclipse begins at any place, we determine by inspection between what pair of these curved lines the place is situated. The eclipse will then begin between these two hours of Greenwich mean time: the fraction of the hour may be determined by dividing the hour proportionally to the space which it represents on the map. This division may be a little more exact by allowing for the changes in this space as indicated by their varying width. The Greenwich mean time thus found must be reduced to local mean time by applying the longitude.

As an example, suppose we wish to find the time at which the eclipse of 1886, March 5, begins at San Francisco.

We find this point to be situated between the curves of 10 hours and 11 hours, but a little nearer to the former than to the latter. Comparing the distance of the place from the former curve with the distance between the curves of 10 hours and 11 hours we find it to correspond to about 29 minutes, and increasing this by one minute because the distance between the curves is increasing, we have for time of beginning $10^h\ 30^m$—which is probably within 2 or 3 minutes of the truth. In the same way we find the approximate time of ending to be $12^h\ 42^m$.

Changing to local time the result will be:—

		Beginning.	Ending.
		h m	h m
Greenwich mean time	March 5,	10 30	12 42
Longitude west of Greenwich		8 9.6	8 9.6
Local mean time		2 20.4 ± 2^m	4 32.4 ± 2^m

In the case of total and annular eclipses, a rough estimate of the magnitude of the eclipse may be obtained from the position of the place relatively to the central line and to the limit. On the central line, the eclipse is annular or total; while on the limit, the limb of the moon only grazes that of the sun.

More Accurate Computations.—A more accurate determination of the phases as visible at any point of the earth's surface may be obtained from the Besselian elements, which are given for every ten minutes of Greenwich mean time. Their geometric signification is as follows:—

Let us imagine a plane passing through the centre of the earth, perpendicular to the right line joining the centres of the sun and moon. This latter line is the axis of the moon's shadow, and the plane is called the *fundamental plane*. We take the intersection of this plane with that of the earth's equator as the axis of X, and the centre of the earth as the origin of co-ordinates. The axis of Y is perpendicular to that of X, and directed toward the north. x and y are then the co-ordinates of the point in which the axis of the shadow intersects the fundamental plane. The angle d, of which the sine and cosine are both given, is the declination of that point of the celestial sphere toward which the axis of the shadow is directed; this direction being that from the earth toward the moon and sun. The angle μ is the Greenwich hour-angle of this same point of the celestial sphere.

The quantities l and l' are the radii of the shadow-cones upon the fundamental plane, l corresponding to the penumbra, and l' to the umbra, or annulus. The notation is that of CHAUVENET's *Spherical and Practical Astronomy*, in which l' is regarded as positive for an annular, and negative for a total, eclipse.

The angles f and f', the tangents of which are given, are the angles which each element of the respective shadow-cones makes with the axis of the shadow; or, they are the semi-angles of the two cones.

At the bottom of the table are given the logarithms of the change of x, y and μ, in one minute, in order to facilitate the interpolation to any required moment.

The method of computing the eclipse from the given elements is as follows: It is premised that the moments of beginning and ending are those at which the distance of the observer from the axis of the shadow or penumbra is equal to the radius of the latter at the point of observation. To find such distance and radius we compute—

(1) The co-ordinates, ξ, η, and ζ, of the observer, at some assumed moment of Greenwich mean time, as near as practicable to the true time of the required phase, together with their variations for one minute.

(2) The co-ordinates x and y of the axis of the shadow at the same moment, which, with their variations for one minute, are taken from the tables of elements.

(3) Hence, the position and motion of the observer relative to the axis of the shadow.

(4) The radius of the penumbra or umbra at a distance from the fundamental plane equal to that of the observer.

(5) Then, assuming the motions to be uniform, we determine the time required for the observer to be brought to a distance from the axis of the shadow equal to this radius.

The formulæ and directions for the several steps in the computation are as follow:—

(1) Find the geocentric co-ordinates of the station referred to the earth's equator, which are represented by $\rho \cos \varphi'$ and $\rho \sin \varphi'$, ρ being the distance from the centre of the earth, and φ' the geocentric latitude. These may be obtained from geodetic tables, or may be computed from the following table by the formulæ—

$$\rho \cos \varphi' = F \cos \varphi$$

$$\rho \sin \varphi' = \frac{\sin \varphi}{G}$$

φ being, as usual, the geographic latitude.

Table for Computing the Geocentric Co-ordinates of a Place.

φ	Log F.		Log G.	
0°	0.00000		0.00302	
		1		2
5	0.00001		0.00300	
		4		3
10	0.00005		0.00297	
		5		5
15	0.00010		0.00292	
		8		8
20	0.00018		0.00284	
		9		9
25	0.00027		0.00275	
		11		11
30	0.00038		0.00264	
		12		12
35	0.00050		0.00252	
		12		13
40	0.00062		0.00239	
		13		13
45	0.00075		0.00226	
		13		13
50	0.00088		0.00213	
		13		12
55	0.00101		0.00201	
		12		12
60	0.00113		0.00189	
		11		11
65	0.00124		0.00178	
		9		9
70	0.00133		0.00169	
		8		8
75	0.00141		0.00161	
		5		6
80	0.00146		0.00155	
		4		3
85	0.00150		0.00152	
		1		1
90	0.00151		0.00151	

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For the assumed Greenwich mean time of computation, take from the table of elements the values of $\sin d$, $\cos d$, and μ. Put:

λ, the longitude west from Greenwich. The co-ordinates of the observer will then be:—

$$\xi = \rho \cos \varphi' \sin (\mu - \lambda)$$
$$\eta = \rho \sin \varphi' \cos d - \rho \cos \varphi' \sin d \cos (\mu - \lambda)$$
$$\zeta = \rho \sin \varphi' \sin d + \rho \cos \varphi' \cos d \cos (\mu - \lambda)$$

and their variations in one minute of mean time will be:—

$$\xi' = [7.6398]\ \rho \cos \varphi' \cos (\mu - \lambda)$$
$$\eta' = [7.6398]\ \rho \cos \varphi' \sin d \sin (\mu - \lambda) = [7.6398]\ \xi \sin d$$

ζ' is not wanted.

(2) The co-ordinates x and y of the axis of the shadow are taken from the tables of elements for the same assumed moment of Greenwich mean time, together with their variations for one minute, which are equal to one-tenth of the differences of two consecutive numbers. The variations for one minute we represent by x' and y'. Their logarithms are given at the foot of the tables.

(3) The distance m and position-angle M of the axis of the shadow relative to the observer, and the relative motions, n and N, are computed by the formulæ:—

$$m \sin M = x - \xi$$
$$m \cos M = y - \eta$$
$$n \sin N = x' - \xi'$$
$$n \cos N = y' - \eta'$$

(4) The radius L of the shadow or penumbra at the distance ζ from the fundamental plane is computed by the formula

$$L = l - \zeta \tan f$$

l and f being found in the table of elements, and ζ computed in (1).

(5) If the time chosen for computation is exactly that of the beginning or end of the eclipse, we shall have—

$$m = L$$

But, as this condition can scarcely ever be fulfilled on a first trial, a correction τ to the assumed time is computed thus: Find the angle ψ from the equation,

$$\sin \psi = \frac{m \sin (M - N)}{L}$$

There will be two values to this angle, of which one will be in the first and the other in the second quadrant when $\sin \psi$ is positive, and one in the third and the other in the fourth when $\sin \psi$ is negative. But, simplicity will be gained by taking only that value of ψ for which $\cos \psi$ is positive. This value lies between the limits $+90°$ and $-90°$. The correction τ to the assumed time will be found in minutes, from—

For beginning: $$\tau = -\frac{m \cos (M - N)}{n} - \frac{L \cos \psi}{n}$$

For ending: $$\tau = -\frac{m \cos (M - N)}{n} + \frac{L \cos \psi}{n}$$

One such pair of values of τ cannot, however, give the times of both beginning and ending with accuracy. To attain accuracy we must, in commencing the computation, assume two times, one as near as practicable to that of beginning, and another near that of ending. These approximate times may be derived from the chart of the eclipse. We shall thus have two pairs of values of τ. The computation for the first assumed time will give a small and nearly correct value for the beginning of the eclipse, and a large value which, added to the assumed time, will give an inaccurate time of ending. The computation for the second assumed time will give a small and nearly correct value for the end, and a large negative and inaccurate one for the beginning. We shall thus deduce two times of beginning and two of ending, of each of which only one is to be considered approximately correct.

The more accurate times of beginning and ending may now be taken in place of the first assumed ones, and the computation may be repeated from the beginning, leading to a pair of values of τ, which should be very small and accurate. Such a repetition of the computation will in general be advisable, to guard against accidental numerical errors. The following theorem will, however, enable us to obtain a second approximation to the true times of each phase without repeating the computation.

THEOREM.—*The error of each result is approximately proportional to the square of the correction* τ, *multiplied by the sine of the sun's hour-angle*, $(\mu-\lambda)$, *for the middle of the interval between the time of computation and that of the phase.*

To apply this theorem we find the two values of $\tau^2 \sin(\mu-\lambda)$ corresponding to the required phase. We then find the ratio of these quantities—which will commonly be a large number, and divide the difference of the results by this ratio. The quotient will be a correction to be applied to the more accurate result in such a way as to make it deviate yet more from the less accurate one. This correction should be positive in the local forenoon, and negative in the afternoon, and its value should never materially exceed $0^{m}.001\ \tau^2$.

Unless the times chosen for computation are unusually in error, say ten minutes or more, the corrected results thus obtained will be theoretically correct within less than a second. But to guard against numerical errors it is better, after making this final correction, to repeat the computations so far as to obtain new values of m and L for the corrected times. If these two quantities agree within a unit of the fourth place of decimals, the times employed are generally correct within a second of time. If they differ too widely, farther corrections and recomputations may be made by the computer according to his own judgment.

It may be remarked that the uncertainty of the ephemerides is such that a prediction may be several seconds in error from this unavoidable cause alone.

Position-angle of Point of Contact.—The position-angle, P, of the point of contact, reckoned from the north point of the sun's limb toward the east, is found by the formula

For beginning: $P = N - \psi \pm 180°$

For end: $P = N + \psi$

it being assumed that, in each case, the value of ψ is taken between the limits $\pm 90°$.

Computation of the eclipse of 1886, March 5, for a point in

Latitude, $\varphi = +\ 37° 48'.6$

Longitude, $\lambda = +\ 122° 24' 40''$

in or near San Francisco, California.

Constants for the given place:—

$\log \rho \cos \varphi' = 9.89822 \qquad \log \rho \sin \varphi' = 9.78509$

From the Eclipse Chart we find for the *approximate* times of the phases as follows:—

	h	m	
Beginning . . .	10	30	Greenwich Mean Time.
Ending . . .	12	40	

We will therefore assume for the first approximation

		Beginning.	Ending.
	(Greenwich Mean Time)	$10^h\ 32^m$	$12^h\ 45^m$
(Page 413)	μ	155° 6′ 54″	188° 22′ 24″
	λ	122 24 40	122 24 40
	$\mu-\lambda$	32 42 14	65 57 44
	$\rho \cos \varphi'$	9.89822	9.89822
	$\sin(\mu-\lambda)$	9.73263	9.96060
	$\log \xi$	9.63085	9.85882
	ξ	+ 0.42742	+ 0.72247

			Beginning.		Ending.
	$\rho \sin \varphi'$		9.78509		9.78509
	$\cos d$		9.99778		9.99780
	$\log \rho \sin \varphi' \cos d$		9.78287		9.78289
(1)	$\rho \sin \varphi' \cos d$	+	0.60656	+	0.60660
	$\rho \sin \varphi'$		9.89822		9.89822
	$\sin d$		9.00410 *n*		9.00148 *n*
	$\cos (\mu - \lambda)$		9.92504		9.60996
	$\log \rho \sin \varphi' \sin d \cos (\mu - \lambda)$		8.82736 *n*		8.50966 *n*
(2)	$\rho \sin \varphi' \sin d \cos (\mu - \lambda)$	—	0.06720	—	0.032334
(1)−(2)	η	+	0.67376	+	0.638934
	$\rho \sin \varphi'$		9.78509		9.78509
	$\sin d$		9.00410 *n*		9.00148 *n*
	$\log \rho \sin \varphi' \sin d$		8.78919 *n*		8.78657 *n*
(3)	$\rho \sin \varphi' \sin d$	—	0.06154	—	0.061174
	$\log \rho \cos \varphi' \cos (\mu - \lambda)$		9.82326		9.50818
	$\cos d$		9.99778		9.99780
	$\log \rho \cos \varphi' \cos d \cos (\mu - \lambda)$		9.82104		9.50598
(4)	$\rho \cos \varphi' \cos d \cos (\mu - \lambda)$	+	0.66230	+	0.32061
(3)+(4)	ζ	+	0.60076	+	0.259436
	$\log \rho \cos \varphi' \cos (\mu - \lambda)$		9.82326		9.50818
	$\log \mu'$ (constant)		7.63992		7.63992
	$\log \xi'$		7.46318		7.14810
	ξ'	+	0.002905	+	0.001406
	$\log \xi$		9.63085		9.85882
	$\sin d$		9.00410 *n*		9.00148 *n*
	$\log \mu'$ (constant)		7.63992		7.63992
	$\log \eta'$		6.27487 *n*		6.50022 *n*
	η'	—	0.000188	—	0.000316
(Page 413)	x	+	0.18741	+	1.26827
	ξ	+	0.42742	+	0.72247
	$x - \xi$	—	0.24001	+	0.54580
	y	+	0.15825	+	0.48864
	η	+	0.67376	+	0.63893
	$y - \eta$	—	0.51551	—	0.15029
	x'	+	0.008128	+	0.008126
	ξ'	+	0.002905	+	0.001406
	$x' - \xi'$	+	0.005223	+	0.00672
	y'	+	0.002483	+	0.002485
	η'	—	0.000188	—	0.000316
	$y' - \eta'$	+	0.002671	+	0.002801
	l		.56949		.56933
	$\log \tan f$		7.67320		7.67319
	$\log \zeta$		9.77870		9.41403
	$\log \zeta \tan f$		7.45190		7.08722
	$\zeta \tan f$		.002831		.001222

	Beginning.	Ending.
$L = l - \zeta \tan f$	0.566659	0.568108
$\log (x-\xi)$	9.38023 n	9.73703
$\log (y-\eta)$	9.71224 n	9.17693 n
$\tan M$	9.66799	0.56010 n
M	204° 58′	105° 23′ 43″
$\sin M$	9.62540 n	9.98413
$\log m$	9.75483	9.75290
$\log (x'-\xi')$	7.71792	7.82737
$\log (y'-\eta')$	7.42667	7.44731
$\tan N$	0.29125	0.38006
N	62° 55′	67° 22′ 25″
$\cos N$	9.65828	9.58515
$\log n$	7.76839	7.86216
$M-N$	142° 3′	38° 1′ 18″
$\sin (M-N)$	9.78886	9.78955
$\log m$	9.75483	9.75290
	9.54369	9.54245
$\log L$	9.75332	9.75443
$\sin \psi$	9.79037	9.78802
ψ	38° 6′ 24″	37° 51′ 50″
$\log \frac{m}{n}$	1.98644	1.89074
$\cos (M-N)$	9.89683 n	9.89640
$\log \frac{m}{n} \cos (M-N)$	1.88327 n	1.78714
$-\frac{m}{n} \cos (M-N)$	+ 76.430	− 61.254
$\log L$	9.75332	9.75443
$\cos \psi$	9.89590 n	9.89734
	9.64922 n	9.65177
$\log n$	7.76839	7.86216
$\log \frac{L}{n} \cos \psi$	1.88083 n	1.78961
$\frac{L}{n} \cos \psi$	− 76.004	+ 61.604
τ	+ $0^m.426$	+ $0^m.350$
t	$10^h\ 32^m.000$	$12^h\ 45^m.000$
T	$10^h\ 32.^m426$	$12^h\ 45^m.350$

the assumed times are very near the computed times no correction is necessary. There-
we have

	h	m	s	
Beginning of eclipse	10	32	25.5	Greenwich Mean Time.
End of eclipse	12	45	21.0	

ngle of position:

	Beginning.		End.	
	°	′	°	′
N	62	55	67	22.4
ψ (+180°)	218	6.4	37	51.8
P	204	48.6	105	14.2

Elements of Occultations.—Pages 418—444 give the elements for the prediction of the times of occultation of stars and planets by the moon. In the columns referring to the star, those headed *Red'ns from* 1886.0 give the quantities necessary to reduce the mean place of the star at the beginning of 1886 to its apparent place at the time of occultation. These reductions are sufficiently accurate to be definitive.

The quantities in the following five columns are all given for the moment of geocentric conjunction of the star and moon in right ascension. Let there be a line passing from the star through the centre of the moon, and let a plane perpendicular to this line pass through the centre of the earth: this plane will be the fundamental plane for the occultation. The system of co-ordinates is similar to that already described for eclipses. The cone circumscribing the moon and star may be regarded as a cylinder having everywhere the same diameter as the moon. This cylinder will intercept the fundamental plane in a circle of which the linear diameter will be the same as that of the moon.

The *Washington Mean Time* is the moment at which the two bodies are in geocentric conjunction in right ascension. At this moment the co-ordinate x of the axis of the cylinder on the fundamental plane has the value zero. The column *Hour-Angle H* gives the common geocentric hour-angle of the moon and star at the same moment, counted from the meridian of Washington—positive toward the west and negative toward the east. Column Y gives the co-ordinate y of the axis of the cylinder upon the fundamental plane at the same moment. Columns x' and y' give the hourly variation of x and y. The linear unit in these columns is the earth's equatorial radius. The limiting parallels, north and south, show the extreme limits of latitude within which the occultation will be visible.

By the aid of these elements, the Washington mean time of immersion and emersion of a star behind the limb of the moon may be computed for any part of the earth by a method nearly the same as that already explained for computing eclipses, only more simple.

We shall first show how to compute an isolated occultation for a particular place, assuming it to be visible at that place, and then show how all the occultations which will be visible at a place may be selected and computed by a more rapid process.

(1) The geocentric co-ordinates of the place, $\rho \sin \varphi'$ and $\rho \cos \varphi'$, are to be computed with three or four places of decimals by the formulæ,

$$\rho \sin \varphi' = \frac{\sin \varphi}{G}$$
$$\rho \cos \varphi' = F \cos \varphi$$

already given in connection with the eclipses.

As in the case of eclipses, it is necessary to have an approximate time of the phenomenon, corresponding to that obtained from the charts of the eclipses. The quantity H being the Washington west hour-angle of the two bodies at the moment of geocentric conjunction, $H - \lambda$ will be the local hour-angle of the star at this same moment. Let us call this angle h_0, putting

$$h_0 = H - \lambda$$

The next step will then be to find the approximate moment of apparent conjunction in right ascension as seen from the place. An approximate correction to reduce the time and hour-angle for geocentric conjunction to those for apparent conjunction may be taken from Mr. Downes's table, on pages 448—449. This correction will have the same sign as h_0.

When this table is not available, the correction may be computed thus: Compute the quantities ξ_0, ξ', and τ from the formulæ,

$$\xi_0 = \rho \cos \varphi' \sin h_0$$
$$\xi' = [9.4192] \cos (h_0 + \tfrac{1}{8} h_0)$$
$$\tau = \frac{\xi_0}{x' - \xi'}$$

τ will then be the approximate interval between the times of geocentric and local conjunction. By applying it to the Washington mean time of the former, as given with the elements, we shall have the Washington mean time of the latter within a few minutes.

The average duration of an occultation is about an hour. Thence, by adding $0^h.5$ to and subtracting it from the mean time of apparent conjunction, we shall have rough times of the phases of immersion and emersion for farther computation. Let us then put,

$\tau_1 = \tau - 0^h.5$

$\tau_2 = \tau + 0^h.5$

T, the Washington mean time of geocentric conjunction in R. A.

d, the declination of the star.

(2) Compute for the moments $T + \tau_1$ and $T + \tau_2$ the following quantities, in which we write τ for each of the quantities τ_1 and τ_2. The latter, when used as angles, are to be changed to arc by multiplying by 15°, and the minutes are to be further increased by one-sixth the number of degrees in order to reduce to the sidereal hour-angle.

$$
\begin{aligned}
\xi &= \rho \cos \varphi' \sin (h_0 + \tau) \\
\eta &= \rho \sin \varphi' \cos d - \rho \cos \varphi' \sin d \cos (h_0 + \tau) \\
\xi' &= [9.4192]\, \rho \cos \varphi' \cos (h_0 + \tau) \\
\eta' &= [9.4192]\, \rho \cos \varphi' \sin d \sin (h_0 + \tau) = [9.4192]\, \xi \sin d \\
x &= x' \tau \\
y &= Y + y' \tau
\end{aligned}
$$

Compute m, M, n and N from the equations

$$
\begin{aligned}
m \sin M &= x - \xi \\
m \cos M &= y - \eta \\
n \sin N &= x' - \xi' \\
n \cos N &= y' - \eta' \\
n' &= \frac{n}{60} = [8.2218]\, n \\
\sin \psi &= [0.5650]\, m \sin (M - N)
\end{aligned}
$$

Then, t_1 and t_2 from the equations

$$t_1 = -\frac{m}{n'} \cos (M - N) - \frac{[9.4350]}{n'} \cos \psi \quad \text{(Beginning.)}$$

$$t_2 = -\frac{m}{n'} \cos (M - N) + \frac{[9.4350]}{n'} \cos \psi \quad \text{(End.)}$$

The quantities t_1 and t_2 will then be the corrections in minutes to be applied to the respective times $T + \tau_1$ and $T + \tau_2$ to obtain the Washington mean times of the phases.

As in the case of eclipses, the small value of t_1 will give an accurate result for one phase, and the large value an inaccurate result for the other. Both accurate results may then be corrected by comparison with the inaccurate one, in the way described for eclipses, and a result obtained which will probably be correct within a fraction of a minute of time.

As a check upon the result, it will be advisable to compute ξ, η, x and y for the moments finally obtained. If the times are correct these quantities will fulfil the condition,

$$\sqrt{(x - \xi)^2 + (y - \eta)^2} = 0.2723$$

If $\log m \sin (M - N) = 9.4350$ nearly, a recalculation will generally be necessary to determine whether, numerically, $\sin \psi < 1$, or $\sin \psi > 1$. In the latter case, the impossible value of $\sin \psi$ indicates that an occultation at the given place is impossible, unless the computed distance from the moon's limb is within the errors of the ephemerides of the moon and star.

In such cases of near approach to the moon's limb, we may take $\psi = 90°$, or $270°$, according as $\sin (M - N)$ is positive or negative; and for finding the time of nearest approach,

$$t = -\frac{m \cos (M - N)}{n'}$$

Putting π for the moon's horizontal parallax, the distance from the moon's limb will be,

$$\pi\,[m \sin (M - N) - 0.2723]$$

disregarding the sign of $\sin (M - N)$; or, allowing for the augmentation of the semidiameter,

$$\pi\,[m \sin (M - N) - 0.2723]\,[1 + z \sin \pi]$$

where

$$z = \rho \cos \varphi' \cos d \cos (h_0 + \tau) + \rho \sin \varphi' \sin d$$

The position-angle, P, of the line from the moon's centre to the star at the times of contact, reckoned from the north point toward the east, is given by the formulæ: —

$$P = N - \psi \qquad \text{for immersion,}$$
$$P = N + \psi \pm 180^\circ \qquad \text{for emersion,}$$

it being supposed that the value of ψ, in each case, is taken between the limits $\pm 90^\circ$.

To find the angle from the vertex, we compute the angle C from the formula,

$$\tan C = \frac{\xi + t\,\xi'}{\eta + t\,\eta'}$$

in which the value of t corresponding to the phase is to be used. Then

$$V = P - C$$

is the angle from the vertex, also reckoned from the north toward the east.

As an example of an isolated occultation, we shall compute that of α Tauri, 1886, November 12, for Clinton, New York, whose position is—

$$\varphi = + 43^\circ\ 3'\ 17''$$
$$\lambda = - \quad 0^h\ 6^m\ 34^s.65$$

Constants for the given place	$\log \rho \sin \varphi' = 9.8319$	$\log \rho \cos \varphi' = 9.8645$
From the table of elements, page 440	$H = - 0^h\ 23^m.3$	
Hence	$h_0 = H - \lambda = - 0^h\ 16^m.7$	

From the equations on page 507, the correction for the time of apparent conjunction is found to be $- 10^m$. Applying this to the Washington mean time of geocentric conjunction, as given in the elements (page 440), we have the approximate mean time of apparent conjunction $12^h\ 27^m$. As the occultation is nearly central, the duration will considerably exceed the average period; we will therefore subtract and add 40 minutes, and we shall have the approximate Washington times of immersion and emersion, to be used in the computation; thus,

Immersion,	$\tau_1 = - 50^m$;	$T_1 =$ Nov. 12, $11^h\ 47^m$
Emersion,	$\tau_2 = + 30^m$;	$T_2 =$ Nov. 12, $13^h\ 7^m$

		Immersion.		Emersion.
		h m		h m
h_0	−	0 16.7	−	0 16.7
τ (reduced to sidereal time)	−	50.137	+	30.082
$h_0 + \tau$	−	1 6.837	+	0 13.382
$h_0 + \tau$ (in arc)	−	16° 42′.5	+	3° 20′.7
$\sin d$		9.44768		9.44768
$\cos d$		9.98224		9.98224
$\rho \cos \varphi'$		9.86450		9.86450
$\sin (h_0 + \tau)$		9.45864 n		8.76605
$\log \xi$		9.32314 n		8.63055
ξ	−	0.21044	+	0.04271
$\rho \sin \varphi'$		9.83190		9.83190
$\cos d$		9.98224		9.98224
$\rho \sin \varphi' \cos d$		9.81414		9.81414
(1)	+	0.65184	+	0.65184

		Immersion.		Emersion.
$\rho \cos \varphi' \sin d$		9.31218		9.31218
$\cos (h_0 + \tau)$		9.98127		9.99926
$\rho \cos \varphi' \sin d \cos (h_0 + \tau)$		9.29345		9.31144
(2)	+	0.19654	+	0.20485
(1)–(2) η	+	0.45530	+	0.44699
(const.) log		9.41920		9.41920
$\rho \cos \varphi' \cos (h_0 + \tau)$		9.84577		9.86376
$\log \xi'$		9.26497		9.28296
ξ'	+	0.18406	+	0.19185
(const.) log		9.41920		9.41920
$\xi \sin d$		8.77082 n		8.07823
$\log \eta'$		8.19002 n		7.49743
η'	–	0.01549	+	0.00314
$x = x' \tau$	–	0.47668	+	0.28600
ξ	–	0.21044	+	0.04271
$x - \xi$	–	0.26624	+	0.24329
$y = Y + y' \tau$	+	0.42548	+	0.54935
$y - \eta$	–	0.02982	+	0.10236
$x' - \xi'$	+	0.38794	+	0.38015
$y' - \eta'$	+	0.10839	+	0.08976
$\log m \sin M$		9.42526 n		9.38612
$\log m \cos M$		8.47451 n		9.01013
$\tan M$		0.95075		0.37599
M		263° 36′ 33″		67° 10′ 55″
$\cos M$		9.04653 n		9.58862
$\log m$		9.42798		9.42151
$\log n \sin N$		9.58876		9.57995
$\log n \cos N$		9.03499		8.95308
$\tan N$		0.55377		0.62687
N		74° 23′ 22″		76° 42′ 52″
$\cos N$		9.42992		9.36135
$\log n$		9.60507		9.59173
		8.22180		8.22180
$\log n'$		7.82687		7.81353
$M - N$		189° 13′ 11″	–	9° 31′ 57″
$\sin (M - N)$		9.20472 n		9.21907 n
$\log m$		9.42798		9.42151
const. log		0.56500		0.56500
$\sin \psi$		9.19770 n		9.20558 n
ψ		189° 4′ 14″	–	9° 14′ 18″
$\cos (M - N)$		9.99436 n		9.99396
$\log \frac{m}{n'}$		1.60111		1.60798
$\cos \psi$		9.99454 n		9.99434
$[9.4350] \div n'$		1.60813		1.62147

		Immersion.		Emersion.
$-\frac{m}{n'}\cos(M-N)$	+	39.396	−	[illegible]
$\frac{[9.4350]}{n'}\cos\psi$	±	40.057	±	41.287
t_1	..	0.659	+	1.297
t_2 (inaccurate)	+	79.455	−	81.277
		h m		h m
Washington conjunction + τ		11 47.00		13 7.00
Washington mean time of phase Nov. 12,		11 46.341		13 8.297
$-\lambda$	+	6.577	+	6.577
Clinton mean time of phase Nov. 12,		11 52.918		13 14.874

These times being very near the assumed ones, require no correction. When a correction is considered necessary, it may be computed in the same way as described for eclipses, but for the mere purpose of prediction, it need be executed only for the emersion.

For the position angles we have

	Immersion.	Emersion.
N	74° 23′.4	76° 42′.9
ψ	189 4.2	− 9 14.3
	− 180	+ 180
Q	83 27.6	247 28.6

Prediction of Many Occultations for a Given Place.—When it is desired to predict all the occultations which will be visible at some one place, tables may be constructed and applied in such a way as to greatly diminish the labor of computation. In using such tables, the most convenient course will be to find for each occultation the hour-angle of the star at the moment of apparent conjunction in right ascension, as seen from the place of observation. The table of elements, pages 418—444, gives H, the Washington hour-angle at the moment of geocentric conjunction. The corresponding geocentric hour-angle at the place will be—

$$h_0 = H - \lambda \qquad (\lambda = \text{west longitude from Washington}).$$

The moment of apparent conjunction, as seen from the station, will be given by the condition $\xi = x$; or, using the values of ξ and x,

$$\rho \cos \varphi' \sin h = x' \tau$$

h being the west hour-angle of the star at the moment in question, and τ the interval, in hours of mean time, which has elapsed since geocentric conjunction. We shall therefore have,

$$h = h_0 + \tau$$

for the hour-angle at the end of the interval τ after geocentric conjunction. In strictness, τ should here be multiplied by the factor $1 + \frac{1}{365.25}$, because the star moves a little more than 15° in an hour of mean time; but the error arising from the neglect of the factor is too small to be important, as it will affect the predicted time of conjunction by less than 10 seconds. The equation for finding τ is therefore,

$$\rho \cos \varphi' \sin (h_0 + \tau) = x' \tau$$

The quantities h_0 and x' being derived immediately from the data of the Ephemeris, the quantity τ is readily obtained by successive approximation, and may be tabulated as a function of h_0 and x'. The computation of τ is effected as follows: We have

$$\sin (h_0 + \tau) = \sin h_0 + 2 \sin \tfrac{1}{2} \tau \cos (h_0 + \tfrac{1}{2} \tau) \qquad (1)$$

be value of τ in arc being seldom more than 24° we have put τ itself for $2 \sin \frac{1}{2}\tau$. The uation will then become

$$\rho \cos \varphi' \sin h_0 + \tau \rho \cos \varphi' \cos (h_0 + \tfrac{1}{2}\tau) = x' \tau$$

om which we find

$$\tau = \frac{\rho \cos \varphi' \sin h_0}{x' - k \rho \cos \varphi' \cos (h_0 + \frac{1}{2}\tau)} \qquad (2)$$

o tabulate τ, we must first have a table of the quantities

$$\begin{aligned} \xi &= \rho \cos \varphi' \sin h \\ \xi' &= [9.41916]\, \rho \cos \varphi' \cos h \end{aligned} \qquad (3)$$

hich table may be formed for every 10 minutes (in time) of h. If we then put ξ_0 for the alue of ξ corresponding to $h = h_0$, and ξ'_1 for the value of ξ' corresponding to $h = h_0 + \frac{1}{2}\tau$, e shall have

$$\tau = \frac{\xi_0}{x' - \xi'_1} \qquad (4)$$

Since we must know the value of τ, approximately, before we can take ξ'_1 from the table, this quation can be solved only by successive approximations. The approximations converge so apidly as to offer no difficulty. It will be best to begin by computing values of τ for the two xtremes of x', namely, $x' = 0.48$ and $x' = 0.60$, because the approximate values of τ can then e interpolated for all intermediate values of x'. For the first approximation may be taken —

$$\begin{aligned} \tfrac{1}{2}\tau &= 50^m \sin \frac{4}{3} h_0 \quad (\text{for } x' = 0.48) \\ \tfrac{1}{2}\tau &= 40^m \sin \frac{4}{3} h_0 \quad (\text{for } x' = 0.60) \end{aligned} \qquad (5)$$

r, the approximate values of τ may be taken from Mr. DOWNES's table, pages 448—449. It will e best to make the computation for every 30^m of h_0, and to find the intermediate values of τ or every 10^m by interpolation. Then for each 30^m of h_0 we take ξ' from a table with the argu- nent $h_0 + \frac{1}{2}\tau$, and log ξ with the argument h_0, and thence compute τ by (4). If the value of τ hus arrived at differs more than 3^m from that employed in taking out ξ', a new value may be sed to correct ξ', and the computation may be repeated. The values corresponding to $x' = 0.51$, $x' = 0.54$, and $x' = 0.57$, can then be computed with the single interpolation of approximate alues of τ, and afterward the table can be extended by interpolation to every 0.01 of x' between $x' = 0.48$ and $x' = 0.62$. It will be best to compute τ in the first place to every 0.001 of an our, and to drop the last figure in forming the definitive table. We shall call the table thus ormed *Table I.*

The values of η and η' may then be tabulated for every degree of the star's declination, and very 10^m of h. It will not be really necessary to compute the table for negative values of d, ince by putting

$$\begin{aligned} \eta_1 &= \quad \rho \sin \varphi' \cos d \\ \eta_2 &= -\rho \cos \varphi' \sin d \cos h \end{aligned}$$

η_1 may be given in a table of single-entry; and taking η_2 from the table of double-entry for a osit ve d, we shall have

$$\eta = \eta_1 \pm \eta_2$$

he lower sign being used for a negative d. But the extension of the table for η to negative alues of d is so readily made that it will probably be found better to do it, so as to save taking ut η_1 and η_2 separately.

We shall call this table for η *Table II*, and the corresponding one for η' with the same argu- nents *Table III.* The precepts for using the tables will then be as follow: —

From Table I with the arguments x' and $H - \lambda = h_0$ take out the value of τ. It will be ufficient to use the nearest 0.01 of x'. τ will be of the same sign as h_0. Then, enter Table I with the arguments d (the star's declination) and $h = h_0 + \tau$, and take out the value of η.

Form the quantities $y = Y + y'\tau$, and $y - \eta$. If the latter quantity lies between the limits ± 0.28, it is almost certain that there will be an occultation. If it falls without the limits ± 0.33, it is almost certain that there will not be an occultation. Between the years 1881 and 1890 these last limits may be reduced to ± 0.32, and cases near this limit may be rejected if y' is small. A convenient rnle to adopt will be —

$$\begin{array}{rll} y' < 0.10, & \text{limits} = \pm\ 0.29 \\ 10 < y' < 0.15, & \text{limits} = \pm\ 0.30 \\ 15 < y' < 0.20, & \text{limits} = \pm\ 0.31 \\ 20 < y' & \text{limits} = \pm\ 0.33 \text{ or } \pm\ 0.32 \end{array}$$

Here, only the absolute value of y' is to be considered, without respect to its algebraic sign.

If $y - \eta$ falls between the limits thus indicated, take the values of ξ' and η' from the appropriate tables and compute v, Q and Δ from the equations

$$\begin{aligned} v \sin Q &= y' - \eta' \\ v \cos Q &= x' - \xi' \\ \Delta &= (y - \eta) \cos Q \end{aligned}$$

If $\Delta > 0.2723$ or $\log \Delta > 9.4350$ there will be no occultation, or, at best, the moon will only graze the star when $\Delta - 0.2723$ is very small. If $\Delta < 0.2723$, compute

$$\tau_1 = -\frac{y - \eta}{v} \sin Q \qquad \cos P = \frac{\Delta}{0.2723} \qquad (P < 180^\circ)$$

$$\tau_2 = \frac{0.2723 \sin P}{v}$$

We shall then have—

Local mean time of immersion, $T - \lambda + \tau + \tau_1 - \tau_2$
Local mean time of emersion, $T - \lambda + \tau + \tau_1 + \tau_2$
Position-angle from north toward east at immersion, $180^\circ - Q - P$
Position-angle from north toward east at emersion, $180^\circ - Q + P$

In predicting the occultations for a given place, the first operation will be to go over the list of occultations in the Ephemeris, and select those which may be visible. The conditions of possible visibility are:—

1. The limiting parallels in the last columns must include the latitude of the place.

2. The quantity $H - \lambda$, taken without regard to sign, must be less than the semi-diurnal arc of the star by at least one hour. On very rare occasions an emersion mignt be seen in the east horizon, or an immersion in the west, when this difference is a few minutes less than an hour.

3. The sun must not be much more than an hour above the horizon at the local mean time $T - \lambda$, unless the star is bright enough to be seen in the day time.

The most convenient course will be to write the value of $-\lambda$ on the bottom of a sheet of paper, and, passing through the list of occultations, pause over each one for which condition (1) is fulfilled, and examine whether conditions (2) and (3) are fulfilled. If either fails, the computer passes on. Very often it will require some examination to find whether $H - \lambda$ or $T - \lambda$ falls within the limits; in these cases, the computer may mark the occultation for trial and leave the decision for the subsequent operations. The whole list can be gone over in less than a day, and it will probably be found that about one-tenth of the occultations are marked for trial.

Phenomena of Planets and Satellites, pages 450—483.—These are, for the most part, sufficiently explained in the body of the work. The following additional explanations are added for completeness.

Disks of Mercury and Venus, pages 450—451.—The angle θ, needed in reducing meridian observations, is the angle which the arc of great circle from the planet to the sun makes with the

arc from the planet toward the west, reckoned in the direction west, north, east, south. This position-angle is reckoned from 0° to 360°, as in the measurement of double stars, the planet taking the place of the central star. But its measure is 90° greater than that of a double star.

We may also regard θ as expressing the angle which the line of cusps makes with the meridian, the positive direction of the meridian being toward the north, and the positive direction of the line of cusps that in which a person following this line would have the centre of the planet upon his right.

Satellites and Disk of Mars, page 452.—This page gives the Washington mean times of eastern and western elongations, the position angles and distances of the satellites for the twenty days preceding and following opposition.

Satellites of Jupiter, pages 453—477.—The times of phenomena are explained at the foot of each page; the diagrams on page 453.

Phenomena, pages 484 and 485.—The conjunctions, quadratures, and oppositions of the planets with respect to the sun give the hours when the longitude of each planet differs from that of the sun by 0°, 90°, or 180°.

The conjunctions of the moon and planets with each other are given in right ascension. The degrees and minutes to the right show the difference of declination at the moment of conjunction.

Latitude by Observed Altitude of Polaris.—Table IV replaces the Tables A, B, C, D, given as a *Supplement* to the volumes of the Ephemeris for 1874—1881, and is intended for use at sea and reconnaissance on land. It will furnish an approximate value of the latitude, the probable error of which, in so far as the table is concerned, will be a few tenths of a minute of arc.

The directions for using the table are adapted to a right ascension of Polaris equal to $1^h\ 17^m.4$. Somewhat greater accuracy may be insured by substituting the right ascension of Polaris at the date of observation, from pages 302—313 of this volume.

APPENDIX.

ON THE CONSTRUCTION OF THE AMERICAN EPHEMERIS AND NAUTICAL ALMANAC FOR 1886.

The adopted constants of precession, nutation, and aberration are those of Struve and Peters, namely:—

$$\begin{aligned} \text{Precession} &= 50''.2411 + 0''.0002268\ t \\ \text{Nutation} &= 9''.2231 + 0''.000009\ t \\ \text{Aberration} &= 20''.4451 \end{aligned}$$

in which t is the number of years after 1800.0.

The obliquity of the ecliptic is that of Hansen's *Tables du Soleil*, which is 0''.32 greater than that of Peters, given in the issues of this Ephemeris preceding that for 1882. A comparison of Hansen's mean obliquity with that of Peters and of Le Verrier at different epochs is given in the following table:—

Epoch.	Hansen.			Peters.	Le Verrier.	H.—P.	H.—L.
	°	′	″	″	″	″	″
1750	23	28	18.19	17.44	19.42	+0.75	−1.23
1800	23	27	54.80	54.22	55.63	+0.58	−0.83
1850	23	27	31.42	30.99	31.83	+0.43	−0.41
1900	23	27	8.02	7.76	8.03	+0.26	−0.01

The formulæ for reducing the places of the fixed stars, page 280, correspond to the *Star Tables of the American Ephemeris*, Washington, 1869.

The mean right ascensions of stars have been reduced to Newcomb's fundamental standard, in the catalogue attached to the *Washington Observations for* 1870, Appendix II, with the following exceptions: The right ascensions of the 48 circumpolar stars north of 60° north declination are from Dr. Gould's *Standard Places of Fundamental Stars*, second edition, United States Coast Survey Office, 1866. Of the twelve stars south of 50° south declination, the positions of β Hydri, α Trianguli Australis, and σ Octantis, have been corrected from data furnished by Dr. Gould; while the remaining nine are, as before, from the *British Nautical Almanac* for 1848.

The right ascensions of additional stars in the general list, for which no apparent places are given in the subsequent section, have been taken partly from the *Catalogue of* 1098 *Standard Clock and Zodiacal Stars*, forming Part IV of Vol. I of *Astronomical Papers Prepared for the Use of the American Ephemeris and Nautical Almanac*, Washington, 1881; and partly from the catalogue of the Astronomische Gesellschaft of 1878. A few have been derived from recent catalogues without a rigorous reduction for equinox.

The mean declinations of stars are taken from Boss's paper in the *Report of the Northern Boundary Commission*, Washington, 1879, for all stars found therein. The declinations of all the other stars have been reduced to the same standard, except those of the additional ones above, which have been taken partly from the Astronomische Gesellschaft list, and partly from places in recent catalogues. To the apparent places of Sirius and Procyon have been applied the periodic corrections resulting from Auwers's investigations.

The values of these corrections are:—

Year.	Sirius.		Procyon.	
1886.0	$\Delta\alpha = +0^s.019$	$\Delta\delta = -1''.25$	$\Delta\alpha = +0^s.005$	$\Delta\delta = +1''.05$
1887.0	$\Delta\alpha = +0.040$	$\Delta\delta = -1.13$	$\Delta\alpha = +0.015$	$\Delta\delta = +1.02$

The ephemeris of the sun is constructed from HANSEN *and* OLUFSEN's *Tables du Soleil*, Copenhagen, 1
1853, except that STRUVE's aberration has been used. This is equivalent to adding 0″.19 to the true longitudes, but it does not affect the right ascensions and declinations. The sun's rectangular equatorial co-ordinates have been computed from the longitudes and latitudes by the following formulæ:—

$$X = R \cos \lambda$$
$$Y = R \sin \lambda \cos \omega - 19.3\, R\, \beta$$
$$Z = R \sin \lambda \sin \omega + 44.5\, R\, \beta$$

The reductions to mean equinox, 1885.0, are computed by the formulæ,

$$\Delta X' = + Y \sec \omega\, \Delta \lambda$$
$$\Delta Y' = - X \cos \omega\, \Delta \lambda + \quad \Delta \omega - \quad 9.4\, \tau\, R \sin (\odot + 187^\circ)$$
$$\Delta Z' = - X \sin \omega\, \Delta \lambda - Y \Delta \omega + 21.7\, \tau\, R \sin (\odot + 187^\circ)$$

Wherein—

λ and β are the longitude and latitude of the sun referred to the equinox and ecliptic of the date;
ω, the obliquity of the ecliptic;
$\Delta \lambda$, the reduction of longitude for precession and nutation from January 0;
$\Delta \omega$, the reduction of the mean to the apparent obliquity;
τ, the fraction of the year since January 0.

The numerical coefficients are in units of the seventh place of decimals. The correction for latitude has been taken from GOETZE's paper in the *Astronomical Journal*, Vol. II, page 71.

The mean equatorial horizontal parallax of the sun, adopted from Professor NEWCOMB's *Investigation of the Distance of the Sun and the Elements which depend on it*,* is 8″.848. The adopted semidiameter of the sun at the earth's mean distance is 16′ 2″. In the computations pertaining to eclipses, BESSEL's semidiameter, 15′ 59″.788 has been used.

The right ascension, declination, and parallax of the moon are derived from HANSEN's *Tables de la Lune*, London, 1857, the mean longitude being corrected in accordance with NEWCOMB's *Researches on the Motion of the Moon*, Part I, page 268,† and a corrected table being substituted for Table XXXIV.

The semidiameter of the moon is computed from the moon's horizontal parallax by the formula,

$$S = 0.272274\, \pi + 2''.5$$

The constant 2″.5 is omitted in the computation of eclipses and occultations, as due entirely to telescopic and ocular irradiation.

The ephemeris of Mercury is derived from Professor WINLOCK's *Tables of Mercury*, Washington, 1864. They are based on the older theory of LE VERRIER, published in the Additions to the *Connaissance des Temps* for 1848.

The ephemeris of Venus is derived from Mr. G. W. HILL's *Tables of Venus*, Washington, 1872.

The ephemeris of Mars is derived from manuscript tables constructed from LINDENAU's Tables. Mr. HUGH BREEN's results, contained in his paper *On the Corrections of* LINDENAU's *Elements of Mars*, published in the *Memoirs of the Royal Astronomical Society*, Vol. XX, have also been discussed and applied; and LE VERRIER's secular variations of the elements are likewise adopted. The perturbations produced by Jupiter have been increased by $\frac{1}{30}$ of their value. The following are the corresponding corrected elements and annual variations for Washington, 1855.0:—

$$\begin{array}{lcrcrl}
L & = & 320^\circ\ 13'\ 33''.87 & + & 689101''.1527 & t \\
\pi & = & 333\ 23\ 17.84 & + & 65.9990 & t \\
\Omega & = & 48\ 25\ 55.29 & + & 27.6997 & t \\
i & = & 1\ 51\ \ 2.20 & - & 0.02141 & t \\
e & = & 19238''.75 & + & 0.18549 & t \\
n & = & 689050''.8927 & & & \\
a & = & 1.5236915 & & &
\end{array}$$

The ephemeris of Jupiter is derived from manuscript tables constructed from BOUVARD's Tables, with such changes as were required to make them correspond more nearly to the formulæ.

The ephemeris of Saturn is derived from a provisional theory constructed by Mr. GEORGE W. HILL, and still unpublished.

The ephemerides of Uranus and Neptune are derived from Professor NEWCOMB's Tables, published by the *Smithsonian Institution*.

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* *Astronomical Observations made at the U. S. Naval Observatory, Washington*, 1865, Appendix II.
† *Astronomical Observations made at the U. S. Naval Observatory, Washington*, 1875, Appendix II.

The semidiameters of the planets are computed from the following values:—

	Semidiameter.	Log Dist.	Authority.
Mercury	3.″34	0.00	Le Verrier, *Theory of Mercury.*
Venus	8.546 ± 0.086	0.00	Peirce, from the Washington Observations of 1845 and 1846, made with the Mural Circle.
Mars (polar)	2.842 ± 0.057	0.25	
Jupiter (polar)	18.78 ± 0.067	0.70	
Saturn (polar)	8.77 ± 0.039	0.95	
Uranus	1.68 ± 0.3	1.30	
Neptune	1.28	1.48	
Jupiter (equatorial)	20.00	0.70	
Saturn (equatorial)	9.38	0.95	

The elements of eclipses of the sun and occultations of stars by the moon are adapted to Bessel's method, using the special forms in Chauvenet's *Spherical and Practical Astronomy.* The adopted semidiameters are:—

Semidiameter of the sun at distance unity. . . . 959.″788
Ratio of radius of moon to radius of earth . . . 0.27227

The eclipses of Jupiter's satellites are computed from Todd's *Continuation of* Damoiseau's *Tables,* Washington, 1876. The occultations, transits, etc., are computed from Woolhouse's Tables, *British Nautical Almanac* for 1835, Table II of each satellite having been adapted to Damoiseau's Tables.

The elongations and conjunctions of the satellites of Saturn are computed from manuscript tables by Professor Newcomb.

The apparent elements of the rings of Saturn are computed from Bessel's data, except those for the dusky ring.

The elongations of the satellites of Uranus, and of the satellite of Neptune are prepared from the data of Professor Newcomb's *Uranian and Neptunian Systems,* Washington, 1875.

In compiling the positions of observatories, the latest available data have been used. The positions have been furnished, in many instances, through the courtesy of the directors of the Observatories, in response to a circular issued by the Superintendent of the American Ephemeris.

The reduction to geocentric latitude, and the logarithm of the radius of the earth are derived from Bessel's elements of the terrestrial spheroid, as adapted in Table III of Chauvenet's *Spherical and Practical Astronomy,* Vol. II:—

$$\log e = 8.9122052$$
$$\varphi' - \varphi = -11'\,30''.65 \sin 2\varphi + 1''.16 \sin 4\varphi$$
$$\log \rho = 9.9992747 + 0.0007271 \cos 2\varphi - 0.0000018 \cos 4\varphi$$

Table IV, for finding the latitude from an observed altitude of Polaris, is constructed for—

(1) An altitude of Polaris equal to 45°.
(2) A declination of Polaris equal to + 88° 41′ 40″.

The principal computations of the Ephemeris have been distributed in the following manner:—

The sun has been computed by Mr. Eastwood; the moon's longitude, latitude, semidiameter and horizontal parallax, by Professor Keith; right ascension and declination, by Professor Van Vleck; culminations, by Professor Runkle; lunar distances, by Mr. W. B. Oliver; Mercury and Venus, by Mr. F. P. Austin; Mars, Jupiter, Saturn, Uranus, and Neptune, by Mr. Roberdeau Buchanan; Jupiter's satellites, by Mr. W. F. McK. Ritter. The fixed stars have been prepared by Mr. Wiessner and Mr. Prentiss; the general constants for their reduction, by Mr. Wiessner; the occultations, by Mr. Downes assisted by Mr. J. O. Wiessner; and the eclipses have been computed and the charts projected by Mr. Buchanan.

TABLE I.

TABLE II.—SIDEREAL INTO MEAN SOLAR TIME.

TABLE II.—SIDEREAL INTO MEAN SOLAR TIME.

TO BE SUBTRACTED FROM A SIDEREAL TIME INTERVAL.

Side-real.	8h.	9h.	10h.	11h.	12h.	13h.	14h.	15h.	For Seconds.	
m	m s	m s	m s	m s	m s	m s	m s	m s	s	s
0	1 18.636	1 28.466	1 38.296	1 48.125	1 57.955	2 7.784	2 17.614	2 27.443	0	0.000
1	1 18.800	1 28.630	1 38.459	1 48.289	1 58.119	2 7.948	2 17.778	2 27.607	1	0.003
2	1 18.964	1 28.794	1 38.623	1 48.453	1 58.282	2 8.112	2 17.941	2 27.771	2	0.005
3	1 19.128	1 28.958	1 38.787	1 48.617	1 58.446	2 8.276	2 18.105	2 27.935	3	0.008
4	1 19.292	1 29.121	1 38.951	1 48.780	1 58.610	2 8.440	2 18.269	2 28.099	4	0.011
5	1 19.456	1 29.285	1 39.115	1 48.944	1 58.774	2 8.603	2 18.433	2 28.263	5	0.014
6	1 19.619	1 29.449	1 39.279	1 49.108	1 58.938	2 8.767	2 18.597	2 28.426	6	0.016
7	1 19.783	1 29.613	1 39.442	1 49.272	1 59.101	2 8.931	2 18.761	2 28.590	7	0.019
8	1 19.947	1 29.777	1 39.606	1 49.436	1 59.265	2 9.095	2 18.924	2 28.754	8	0.022
9	1 20.111	1 29.940	1 39.770	1 49.600	1 59.429	2 9.259	2 19.088	2 28.918	9	0.025
10	1 20.275	1 30.104	1 39.934	1 49.763	1 59.593	2 9.423	2 19.252	2 29.082	10	0.027
11	1 20.439	1 30.268	1 40.098	1 49.927	1 59.757	2 9.586	2 19.416	2 29.245	11	0.030
12	1 20.602	1 30.432	1 40.261	1 50.091	1 59.921	2 9.750	2 19.580	2 29.409	12	0.033
13	1 20.766	1 30.596	1 40.425	1 50.255	2 0.084	2 9.914	2 19.744	2 29.573	13	0.035
14	1 20.930	1 30.760	1 40.589	1 50.419	2 0.248	2 10.078	2 19.907	2 29.737	14	0.038
15	1 21.094	1 30.923	1 40.753	1 50.583	2 0.412	2 10.242	2 20.071	2 29.901	15	0.041
16	1 21.258	1 31.087	1 40.917	1 50.746	2 0.576	2 10.405	2 20.235	2 30.065	16	0.044
17	1 21.422	1 31.251	1 41.081	1 50.910	2 0.740	2 10.569	2 20.399	2 30.228	17	0.046
18	1 21.585	1 31.415	1 41.244	1 51.074	2 0.904	2 10.733	2 20.563	2 30.392	18	0.049
19	1 21.749	1 31.579	1 41.408	1 51.238	2 1.067	2 10.897	2 20.727	2 30.556	19	0.052
20	1 21.913	1 31.743	1 41.572	1 51.402	2 1.231	2 11.061	2 20.890	2 30.720	20	0.055
21	1 22.077	1 31.906	1 41.736	1 51.565	2 1.395	2 11.225	2 21.054	2 30.884	21	0.057
22	1 22.241	1 32.070	1 41.900	1 51.729	2 1.559	2 11.388	2 21.218	2 31.048	22	0.060
23	1 22.404	1 32.234	1 42.064	1 51.893	2 1.723	2 11.552	2 21.382	2 31.211	23	0.063
24	1 22.568	1 32.398	1 42.227	1 52.057	2 1.887	2 11.716	2 21.546	2 31.375	24	0.066
25	1 22.732	1 32.562	1 42.391	1 52.221	2 2.050	2 11.880	2 21.709	2 31.539	25	0.068
26	1 22.896	1 32.726	1 42.555	1 52.385	2 2.214	2 12.044	2 21.873	2 31.703	26	0.071
27	1 23.060	1 32.889	1 42.719	1 52.548	2 2.378	2 12.208	2 22.037	2 31.867	27	0.074
28	1 23.224	1 33.053	1 42.883	1 52.712	2 2.542	2 12.371	2 22.201	2 32.031	28	0.076
29	1 23.387	1 33.217	1 43.047	1 52.876	2 2.706	2 12.535	2 22.365	2 32.194	29	0.079
30	1 23.551	1 33.381	1 43.210	1 53.040	2 2.869	2 12.699	2 22.529	2 32.358	30	0.082
31	1 23.715	1 33.545	1 43.374	1 53.204	2 3.033	2 12.863	2 22.692	2 32.522	31	0.085
32	1 23.879	1 33.708	1 43.538	1 53.368	2 3.197	2 13.027	2 22.856	2 32.686	32	0.087
33	1 24.043	1 33.872	1 43.702	1 53.531	2 3.361	2 13.191	2 23.020	2 32.850	33	0.090
34	1 24.207	1 34.036	1 43.866	1 53.695	2 3.525	2 13.354	2 23.184	2 33.013	34	0.093
35	1 24.370	1 34.200	1 44.029	1 53.859	2 3.689	2 13.518	2 23.348	2 33.177	35	0.096
36	1 24.534	1 34.364	1 44.193	1 54.023	2 3.852	2 13.682	2 23.512	2 33.341	36	0.098
37	1 24.698	1 34.528	1 44.357	1 54.187	2 4.016	2 13.846	2 23.675	2 33.505	37	0.101
38	1 24.862	1 34.691	1 44.521	1 54.351	2 4.180	2 14.010	2 23.839	2 33.669	38	0.104
39	1 25.026	1 34.855	1 44.685	1 54.514	2 4.344	2 14.173	2 24.003	2 33.833	39	0.106
40	1 25.190	1 35.019	1 44.849	1 54.678	2 4.508	2 14.337	2 24.167	2 33.996	40	0.109
41	1 25.353	1 35.183	1 45.012	1 54.842	2 4.672	2 14.501	2 24.331	2 34.160	41	0.112
42	1 25.517	1 35.347	1 45.176	1 55.006	2 4.835	2 14.665	2 24.495	2 34.324	42	0.115
43	1 25.681	1 35.511	1 45.340	1 55.170	2 4.999	2 14.829	2 24.658	2 34.488	43	0.117
44	1 25.845	1 35.674	1 45.504	1 55.333	2 5.163	2 14.993	2 24.822	2 34.652	44	0.120
45	1 26.009	1 35.838	1 45.668	1 55.497	2 5.327	2 15.156	2 24.986	2 34.816	45	0.123
46	1 26.172	1 36.002	1 45.832	1 55.661	2 5.491	2 15.320	2 25.150	2 34.979	46	0.126
47	1 26.336	1 36.166	1 45.996	1 55.825	2 5.655	2 15.484	2 25.314	2 35.143	47	0.128
48	1 26.500	1 36.330	1 46.159	1 55.989	2 5.818	2 15.648	2 25.477	2 35.307	48	0.131
49	1 26.664	1 36.493	1 46.323	1 56.153	2 5.982	2 15.812	2 25.641	2 35.471	49	0.134
50	1 26.828	1 36.657	1 46.487	1 56.316	2 6.146	2 15.976	2 25.805	2 35.635	50	0.137
51	1 26.992	1 36.821	1 46.651	1 56.480	2 6.310	2 16.139	2 25.969	2 35.798	51	0.139
52	1 27.156	1 36.985	1 46.815	1 56.644	2 6.474	2 16.303	2 26.133	2 35.962	52	0.142
53	1 27.319	1 37.149	1 46.978	1 56.808	2 6.637	2 16.467	2 26.297	2 36.126	53	0.145
54	1 27.483	1 37.313	1 47.142	1 56.972	2 6.801	2 16.631	2 26.460	2 36.290	54	0.147
55	1 27.647	1 37.476	1 47.306	1 57.136	2 6.965	2 16.795	2 26.624	2 36.454	55	0.150
56	1 27.811	1 37.640	1 47.470	1 57.299	2 7.129	2 16.959	2 26.788	2 36.618	56	0.153
57	1 27.975	1 37.804	1 47.634	1 57.463	2 7.293	2 17.122	2 26.952	2 36.781	57	0.156
58	1 28.138	1 37.968	1 47.797	1 57.627	2 7.457	2 17.286	2 27.116	2 36.945	58	0.158
59	1 28.302	1 38.132	1 47.961	1 57.791	2 7.620	2 17.450	2 27.280	2 37.109	59	0.161
Side-real.	8h.	9h.	10h.	11h.	12h.	13h.	14h.	15h.	For Seconds.	

TABLE II.—SIDEREAL INTO MEAN SOLAR TIME.

TO BE SUBTRACTED FROM A SIDEREAL TIME INTERVAL.

Side-real.	16h.	17h.	18h.	19h.	20h.	21h.	22h.	23h.	Fo… Secon…
m	m s	m s	m s	m s	m s	m s	m s	m s	s
0	2 37.273	2 47.102	2 56.932	3 6.762	3 16.591	3 26.421	3 36.250	3 46.080	0
1	2 37.437	2 47.266	2 57.096	3 6.925	3 16.755	3 26.585	3 36.414	3 46.244	1
2	2 37.601	2 47.430	2 57.260	3 7.089	3 16.919	3 26.748	3 36.578	3 46.407	2
3	2 37.764	2 47.594	2 57.424	3 7.253	3 17.083	3 26.912	3 36.742	3 46.571	3
4	2 37.928	2 47.758	2 57.587	3 7.417	3 17.246	3 27.076	3 36.906	3 46.735	4
5	2 38.092	2 47.922	2 57.751	3 7.581	3 17.410	3 27.240	3 37.069	3 46.899	5
6	2 38.256	2 48.085	2 57.915	3 7.745	3 17.574	3 27.404	3 37.233	3 47.063	6
7	2 38.420	2 48.249	2 58.079	3 7.908	3 17.738	3 27.568	3 37.397	3 47.227	7
8	2 38.584	2 48.413	2 58.243	3 8.072	3 17.902	3 27.731	3 37.561	3 47.390	8
9	2 38.747	2 48.577	2 58.406	3 8.236	3 18.066	3 27.895	3 37.725	3 47.554	9
10	2 38.911	2 48.741	2 58.570	3 8.400	3 18.229	3 28.059	3 37.889	3 47.718	10
11	2 39.075	2 48.905	2 58.734	3 8.564	3 18.393	3 28.223	3 38.052	3 47.882	11
12	2 39.239	2 49.068	2 58.898	3 8.728	3 18.557	3 28.387	3 38.216	3 48.046	12
13	2 39.403	2 49.232	2 59.062	3 8.891	3 18.721	3 28.550	3 38.380	3 48.210	13
14	2 39.566	2 49.396	2 59.226	3 9.055	3 18.885	3 28.714	3 38.544	3 48.373	14
15	2 39.730	2 49.560	2 59.389	3 9.219	3 19.049	3 28.878	3 38.708	3 48.537	15
16	2 39.894	2 49.724	2 59.553	3 9.383	3 19.212	3 29.042	3 38.871	3 48.701	16
17	2 40.058	2 49.888	2 59.717	3 9.547	3 19.376	3 29.206	3 39.035	3 48.865	17
18	2 40.222	2 50.051	2 59.881	3 9.710	3 19.540	3 29.370	3 39.199	3 49.029	18
19	2 40.386	2 50.215	3 0.045	3 9.874	3 19.704	3 29.533	3 39.363	3 49.193	19
20	2 40.549	2 50.379	3 0.209	3 10.038	3 19.868	3 29.697	3 39.527	3 49.356	20
21	2 40.713	2 50.543	3 0.372	3 10.202	3 20.032	3 29.861	3 39.691	3 49.520	21
22	2 40.877	2 50.707	3 0.536	3 10.366	3 20.195	3 30.025	3 39.854	3 49.684	22
23	2 41.041	2 50.870	3 0.700	3 10.530	3 20.359	3 30.189	3 40.018	3 49.848	23
24	2 41.205	2 51.034	3 0.864	3 10.693	3 20.523	3 30.353	3 40.182	3 50.012	24
25	2 41.369	2 51.198	3 1.028	3 10.857	3 20.687	3 30.516	3 40.346	3 50.175	25
26	2 41.532	2 51.362	3 1.192	3 11.021	3 20.851	3 30.680	3 40.510	3 50.339	26
27	2 41.696	2 51.526	3 1.355	3 11.185	3 21.014	3 30.844	3 40.674	3 50.503	27
28	2 41.860	2 51.690	3 1.519	3 11.349	3 21.178	3 31.008	3 40.837	3 50.667	28
29	2 42.024	2 51.853	3 1.683	3 11.513	3 21.342	3 31.172	3 41.001	3 50.831	29
30	2 42.188	2 52.017	3 1.847	3 11.676	3 21.506	3 31.336	3 41.165	3 50.995	30
31	2 42.352	2 52.181	3 2.011	3 11.840	3 21.670	3 31.499	3 41.329	3 51.158	31
32	2 42.515	2 52.345	3 2.174	3 12.004	3 21.834	3 31.663	3 41.493	3 51.322	32
33	2 42.679	2 52.509	3 2.338	3 12.168	3 21.997	3 31.827	3 41.657	3 51.486	33
34	2 42.843	2 52.673	3 2.502	3 12.332	3 22.161	3 31.991	3 41.820	3 51.650	34
35	2 43.007	2 52.836	3 2.666	3 12.496	3 22.325	3 32.155	3 41.984	3 51.814	35
36	2 43.171	2 53.000	3 2.830	3 12.659	3 22.489	3 32.318	3 42.148	3 51.978	36
37	2 43.334	2 53.164	3 2.994	3 12.823	3 22.653	3 32.482	3 42.312	3 52.141	37
38	2 43.498	2 53.328	3 3.157	3 12.987	3 22.817	3 32.646	3 42.476	3 52.305	38
39	2 43.662	2 53.492	3 3.321	3 13.151	3 22.980	3 32.810	3 42.639	3 52.469	39
40	2 43.826	2 53.656	3 3.485	3 13.315	3 23.144	3 32.974	3 42.803	3 52.633	40
41	2 43.990	2 53.819	3 3.649	3 13.478	3 23.308	3 33.138	3 42.967	3 52.797	41
42	2 44.154	2 53.983	3 3.813	3 13.642	3 23.472	3 33.301	3 43.131	3 52.961	42
43	2 44.317	2 54.147	3 3.977	3 13.806	3 23.636	3 33.465	3 43.295	3 53.124	43
44	2 44.481	2 54.311	3 4.140	3 13.970	3 23.800	3 33.629	3 43.459	3 53.288	44
45	2 44.645	2 54.475	3 4.304	3 14.134	3 23.963	3 33.793	3 43.622	3 53.452	45
46	2 44.809	2 54.638	3 4.468	3 14.298	3 24.127	3 33.957	3 43.786	3 53.616	46
47	2 44.973	2 54.802	3 4.632	3 14.461	3 24.291	3 34.121	3 43.950	3 53.780	47
48	2 45.137	2 54.966	3 4.796	3 14.625	3 24.455	3 34.284	3 44.114	3 53.943	48
49	2 45.300	2 55.130	3 4.960	3 14.789	3 24.619	3 34.448	3 44.278	3 54.107	49
50	2 45.464	2 55.294	3 5.123	3 14.953	3 24.782	3 34.612	3 44.442	3 54.271	50
51	2 45.628	2 55.458	3 5.287	3 15.117	3 24.946	3 34.776	3 44.605	3 54.435	51
52	2 45.792	2 55.621	3 5.451	3 15.281	3 25.110	3 34.940	3 44.769	3 54.599	52
53	2 45.956	2 55.785	3 5.615	3 15.444	3 25.274	3 35.104	3 44.933	3 54.763	53
54	2 46.120	2 55.949	3 5.779	3 15.608	3 25.438	3 35.267	3 45.097	3 54.926	54
55	2 46.283	2 56.113	3 5.942	3 15.772	3 25.602	3 35.431	3 45.261	3 55.090	55
56	2 46.447	2 56.277	3 6.106	3 15.936	3 25.765	3 35.595	3 45.425	3 55.254	56
57	2 46.611	2 56.441	3 6.270	3 16.100	3 25.929	3 35.759	3 45.588	3 55.418	57
58	2 46.775	2 56.604	3 6.434	3 16.264	3 26.093	3 35.923	3 45.752	3 55.582	58
59	2 46.939	2 56.768	3 6.598	3 16.427	3 26.257	3 36.086	3 45.916	3 55.746	59
Side-real.	16h.	17h.	18h.	19h.	20h.	21h.	22h.	23h.	S…

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TABLE III.—MEAN SOLAR INTO SIDEREAL TIME.

TO BE ADDED TO A MEAN TIME INTERVAL.

Mean Solar.	$8^{h.}$	$9^{h.}$	$10^{h.}$	$11^{h.}$	$12^{h.}$	$13^{h.}$	$14^{h.}$	$15^{h.}$	For Seconds.	
m	m s	m s	m s	m s	m s	m s	m s	m s	s	s
0	1 18.852	1 28.708	1 38.565	1 48.421	1 58.278	2 8.134	2 17.991	2 27.847	0	0.000
1	1 19.016	1 28.873	1 38.729	1 48.585	1 58.442	2 8.298	2 18.155	2 28.011	1	0.003
2	1 19.180	1 29.037	1 38.893	1 48.750	1 58.606	2 8.463	2 18.319	2 28.176	2	0.005
3	1 19.345	1 29.201	1 39.058	1 48.914	1 58.771	2 8.627	2 18.483	2 28.340	3	0.008
4	1 19.509	1 29.365	1 39.222	1 49.078	1 58.935	2 8.791	2 18.648	2 28.504	4	0.011
5	1 19.673	1 29.530	1 39.386	1 49.243	1 59.099	2 8.956	2 18.812	2 28.668	5	0.014
6	1 19.837	1 29.694	1 39.550	1 49.407	1 59.263	2 9.120	2 18.976	2 28.833	6	0.016
7	1 20.002	1 29.858	1 39.715	1 49.571	1 59.428	2 9.284	2 19.141	2 28.997	7	0.019
8	1 20.166	1 30.022	1 39.879	1 49.735	1 59.592	2 9.448	2 19.305	2 29.161	8	0.022
9	1 20.330	1 30.187	1 40.043	1 49.900	1 59.756	2 9.613	2 19.469	2 29.326	9	0.025
10	1 20.495	1 30.351	1 40.207	1 50.064	1 59.920	2 9.777	2 19.633	2 29.490	10	0.027
11	1 20.659	1 30.515	1 40.372	1 50.228	2 0.085	2 9.941	2 19.798	2 29.654	11	0.030
12	1 20.823	1 30.680	1 40.536	1 50.393	2 0.249	2 10.105	2 19.962	2 29.818	12	0.033
13	1 20.987	1 30.844	1 40.700	1 50.557	2 0.413	2 10.270	2 20.126	2 29.983	13	0.036
14	1 21.152	1 31.008	1 40.865	1 50.721	2 0.578	2 10.434	2 20.290	2 30.147	14	0.038
15	1 21.316	1 31.172	1 41.029	1 50.885	2 0.742	2 10.598	2 20.455	2 30.311	15	0.041
16	1 21.480	1 31.337	1 41.193	1 51.050	2 0.906	2 10.763	2 20.619	2 30.476	16	0.044
17	1 21.644	1 31.501	1 41.357	1 51.214	2 1.070	2 10.927	2 20.783	2 30.640	17	0.047
18	1 21.809	1 31.665	1 41.522	1 51.378	2 1.235	2 11.091	2 20.948	2 30.804	18	0.049
19	1 21.973	1 31.829	1 41.686	1 51.542	2 1.399	2 11.255	2 21.112	2 30.968	19	0.052
20	1 22.137	1 31.994	1 41.850	1 51.707	2 1.563	2 11.420	2 21.276	2 31.133	20	0.055
21	1 22.302	1 32.158	1 42.015	1 51.871	2 1.727	2 11.584	2 21.440	2 31.297	21	0.057
22	1 22.466	1 32.322	1 42.179	1 52.035	2 1.892	2 11.748	2 21.605	2 31.461	22	0.060
23	1 22.630	1 32.487	1 42.343	1 52.200	2 2.056	2 11.912	2 21.769	2 31.625	23	0.063
24	1 22.794	1 32.651	1 42.507	1 52.364	2 2.220	2 12.077	2 21.933	2 31.790	24	0.066
25	1 22.959	1 32.815	1 42.672	1 52.528	2 2.385	2 12.241	2 22.098	2 31.954	25	0.068
26	1 23.123	1 32.979	1 42.836	1 52.692	2 2.549	2 12.405	2 22.262	2 32.118	26	0.071
27	1 23.287	1 33.144	1 43.000	1 52.857	2 2.713	2 12.570	2 22.426	2 32.283	27	0.074
28	1 23.451	1 33.308	1 43.164	1 53.021	2 2.877	2 12.734	2 22.590	2 32.447	28	0.077
29	1 23.616	1 33.472	1 43.329	1 53.185	2 3.042	2 12.898	2 22.755	2 32.611	29	0.079
30	1 23.780	1 33.637	1 43.493	1 53.349	2 3.206	2 13.062	2 22.919	2 32.775	30	0.082
31	1 23.944	1 33.801	1 43.657	1 53.514	2 3.370	2 13.227	2 23.083	2 32.940	31	0.085
32	1 24.109	1 33.965	1 43.822	1 53.678	2 3.534	2 13.391	2 23.247	2 33.104	32	0.088
33	1 24.273	1 34.129	1 43.986	1 53.842	2 3.699	2 13.555	2 23.412	2 33.268	33	0.090
34	1 24.437	1 34.294	1 44.150	1 54.007	2 3.863	2 13.720	2 23.576	2 33.432	34	0.093
35	1 24.601	1 34.458	1 44.314	1 54.171	2 4.027	2 13.884	2 23.740	2 33.597	35	0.096
36	1 24.766	1 34.622	1 44.479	1 54.335	2 4.192	2 14.048	2 23.905	2 33.761	36	0.099
37	1 24.930	1 34.786	1 44.643	1 54.499	2 4.356	2 14.212	2 24.069	2 33.925	37	0.101
38	1 25.094	1 34.951	1 44.807	1 54.664	2 4.520	2 14.377	2 24.233	2 34.090	38	0.104
39	1 25.259	1 35.115	1 44.971	1 54.828	2 4.684	2 14.541	2 24.397	2 34.254	39	0.107
40	1 25.423	1 35.279	1 45.136	1 54.992	2 4.849	2 14.705	2 24.562	2 34.418	40	0.110
41	1 25.587	1 35.444	1 45.300	1 55.156	2 5.013	2 14.869	2 24.726	2 34.582	41	0.112
42	1 25.751	1 35.608	1 45.464	1 55.321	2 5.177	2 15.034	2 24.890	2 34.747	42	0.115
43	1 25.916	1 35.772	1 45.629	1 55.485	2 5.342	2 15.198	2 25.054	2 34.911	43	0.118
44	1 26.080	1 35.936	1 45.793	1 55.649	2 5.506	2 15.362	2 25.219	2 35.075	44	0.120
45	1 26.244	1 36.101	1 45.957	1 55.814	2 5.670	2 15.527	2 25.383	2 35.239	45	0.123
46	1 26.408	1 36.265	1 46.121	1 55.978	2 5.834	2 15.691	2 25.547	2 35.404	46	0.126
47	1 26.573	1 36.429	1 46.286	1 56.142	2 5.999	2 15.855	2 25.712	2 35.568	47	0.129
48	1 26.737	1 36.593	1 46.450	1 56.306	2 6.163	2 16.019	2 25.876	2 35.732	48	0.131
49	1 26.901	1 36.758	1 46.614	1 56.471	2 6.327	2 16.184	2 26.040	2 35.897	49	0.134
50	1 27.066	1 36.922	1 46.778	1 56.635	2 6.491	2 16.348	2 26.204	2 36.061	50	0.137
51	1 27.230	1 37.086	1 46.943	1 56.799	2 6.656	2 16.512	2 26.369	2 36.225	51	0.140
52	1 27.394	1 37.251	1 47.107	1 56.964	2 6.820	2 16.676	2 26.533	2 36.389	52	0.142
53	1 27.558	1 37.415	1 47.271	1 57.128	2 6.984	2 16.841	2 26.697	2 36.554	53	0.145
54	1 27.723	1 37.579	1 47.436	1 57.292	2 7.149	2 17.005	2 26.861	2 36.718	54	0.148
55	1 27.887	1 37.743	1 47.600	1 57.456	2 7.313	2 17.169	2 27.026	2 36.882	55	0.151
56	1 28.051	1 37.908	1 47.764	1 57.621	2 7.477	2 17.334	2 27.190	2 37.047	56	0.153
57	1 28.215	1 38.072	1 47.928	1 57.785	2 7.641	2 17.498	2 27.354	2 37.211	57	0.156
58	1 28.380	1 38.236	1 48.093	1 57.949	2 7.806	2 17.662	2 27.519	2 37.375	58	0.159
59	1 28.544	1 38.400	1 48.257	1 58.113	2 7.970	2 17.826	2 27.683	2 37.539	59	0.162
Mean Solar.	$8^{h.}$	$9^{h.}$	$10^{h.}$	$11^{h.}$	$12^{h.}$	$13^{h.}$	$14^{h.}$	$15^{h.}$	For Seconds.	

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TABLE III.—MEAN SOLAR INTO SIDEREAL TIME.

TO BE ADDED TO A MEAN TIME INTERVAL.

Mean Solar.	16^h	17^h	18^h	19^h	20^h	21^h	22^h	23^h	For Seconds.	
m	m s	m s	m s	m s	m s	m s	m s	m s	s	s
0	2 37.704	2 47.560	2 57.417	3 7.273	3 17.129	3 26.986	3 36.842	3 46.699	0	0.000
1	2 37.868	2 47.724	2 57.581	3 7.437	3 17.294	3 27.150	3 37.007	3 46.863	1	0.003
2	2 38.032	2 47.889	2 57.745	3 7.602	3 17.458	3 27.315	3 37.171	3 47.027	2	0.005
3	2 38.196	2 48.053	2 57.909	3 7.766	3 17.622	3 27.479	3 37.335	3 47.192	3	0.008
4	2 38.361	2 48.217	2 58.074	3 7.930	3 17.787	3 27.643	3 37.500	3 47.356	4	0.011
5	2 38.525	2 48.381	2 58.238	3 8.094	3 17.951	3 27.807	3 37.664	3 47.520	5	0.014
6	2 38.689	2 48.546	2 58.402	3 8.259	3 18.115	3 27.972	3 37.828	3 47.685	6	0.016
7	2 38.854	2 48.710	2 58.566	3 8.423	3 18.279	3 28.136	3 37.992	3 47.849	7	0.019
8	2 39.018	2 48.874	2 58.731	3 8.587	3 18.444	3 28.300	3 38.157	3 48.013	8	0.022
9	2 39.182	2 49.039	2 58.895	3 8.751	3 18.608	3 28.464	3 38.321	3 48.177	9	0.025
10	2 39.346	2 49.203	2 59.059	3 8.916	3 18.772	3 28.629	3 38.485	3 48.342	10	0.027
11	2 39.511	2 49.367	2 59.224	3 9.080	3 18.937	3 28.793	3 38.649	3 48.506	11	0.030
12	2 39.675	2 49.531	2 59.388	3 9.244	3 19.101	3 28.957	3 38.814	3 48.670	12	0.033
13	2 39.839	2 49.696	2 59.552	3 9.409	3 19.265	3 29.122	3 38.978	3 48.834	13	0.036
14	2 40.003	2 49.860	2 59.716	3 9.573	3 19.429	3 29.286	3 39.142	3 48.999	14	0.038
15	2 40.168	2 50.024	2 59.881	3 9.737	3 19.594	3 29.450	3 39.307	3 49.163	15	0.041
16	2 40.332	2 50.188	3 0.045	3 9.901	3 19.758	3 29.614	3 39.471	3 49.327	16	0.044
17	2 40.496	2 50.353	3 0.209	3 10.066	3 19.922	3 29.779	3 39.635	3 49.492	17	0.047
18	2 40.661	2 50.517	3 0.373	3 10.230	3 20.086	3 29.943	3 39.799	3 49.656	18	0.049
19	2 40.825	2 50.681	3 0.538	3 10.394	3 20.251	3 30.107	3 39.964	3 49.820	19	0.052
20	2 40.989	2 50.846	3 0.702	3 10.559	3 20.415	3 30.271	3 40.128	3 49.984	20	0.055
21	2 41.153	2 51.010	3 0.866	3 10.723	3 20.579	3 30.436	3 40.292	3 50.149	21	0.057
22	2 41.318	2 51.174	3 1.031	3 10.887	3 20.744	3 30.600	3 40.456	3 50.313	22	0.060
23	2 41.482	2 51.338	3 1.195	3 11.051	3 20.908	3 30.764	3 40.621	3 50.477	23	0.063
24	2 41.646	2 51.503	3 1.359	3 11.216	3 21.072	3 30.929	3 40.785	3 50.642	24	0.066
25	2 41.810	2 51.667	3 1.523	3 11.380	3 21.236	3 31.093	3 40.949	3 50.806	25	0.068
26	2 41.975	2 51.831	3 1.688	3 11.544	3 21.401	3 31.257	3 41.114	3 50.970	26	0.071
27	2 42.139	2 51.995	3 1.852	3 11.708	3 21.565	3 31.421	3 41.278	3 51.134	27	0.074
28	2 42.303	2 52.160	3 2.016	3 11.873	3 21.729	3 31.586	3 41.442	3 51.299	28	0.077
29	2 42.468	2 52.324	3 2.181	3 12.037	3 21.893	3 31.750	3 41.606	3 51.463	29	0.079
30	2 42.632	2 52.488	3 2.345	3 12.201	3 22.058	3 31.914	3 41.771	3 51.627	30	0.082
31	2 42.796	2 52.653	3 2.509	3 12.366	3 22.222	3 32.078	3 41.935	3 51.791	31	0.085
32	2 42.960	2 52.817	3 2.673	3 12.530	3 22.386	3 32.243	3 42.099	3 51.956	32	0.088
33	2 43.125	2 52.981	3 2.838	3 12.694	3 22.551	3 32.407	3 42.264	3 52.120	33	0.090
34	2 43.289	2 53.145	3 3.002	3 12.858	3 22.715	3 32.571	3 42.428	3 52.284	34	0.093
35	2 43.453	2 53.310	3 3.166	3 13.023	3 22.879	3 32.736	3 42.592	3 52.449	35	0.096
36	2 43.617	2 53.474	3 3.330	3 13.187	3 23.043	3 32.900	3 42.756	3 52.613	36	0.099
37	2 43.782	2 53.638	3 3.495	3 13.351	3 23.208	3 33.064	3 42.921	3 52.777	37	0.101
38	2 43.946	2 53.803	3 3.659	3 13.515	3 23.372	3 33.228	3 43.085	3 52.941	38	0.104
39	2 44.110	2 53.967	3 3.823	3 13.680	3 23.536	3 33.393	3 43.249	3 53.106	39	0.107
40	2 44.275	2 54.131	3 3.988	3 13.844	3 23.700	3 33.557	3 43.413	3 53.270	40	0.110
41	2 44.439	2 54.295	3 4.152	3 14.008	3 23.865	3 33.721	3 43.578	3 53.434	41	0.112
42	2 44.603	2 54.460	3 4.316	3 14.173	3 24.029	3 33.886	3 43.742	3 53.598	42	0.115
43	2 44.767	2 54.624	3 4.480	3 14.337	3 24.193	3 34.050	3 43.906	3 53.763	43	0.118
44	2 44.932	2 54.788	3 4.645	3 14.501	3 24.358	3 34.214	3 44.071	3 53.927	44	0.120
45	2 45.096	2 54.952	3 4.809	3 14.665	3 24.522	3 34.378	3 44.235	3 54.091	45	0.123
46	2 45.260	2 55.117	3 4.973	3 14.830	3 24.686	3 34.543	3 44.399	3 54.256	46	0.126
47	2 45.425	2 55.281	3 5.137	3 14.994	3 24.850	3 34.707	3 44.563	3 54.420	47	0.129
48	2 45.589	2 55.445	3 5.302	3 15.158	3 25.015	3 34.871	3 44.728	3 54.584	48	0.131
49	2 45.753	2 55.610	3 5.466	3 15.322	3 25.179	3 35.035	3 44.892	3 54.748	49	0.134
50	2 45.917	2 55.774	3 5.630	3 15.487	3 25.343	3 35.200	3 45.056	3 54.913	50	0.137
51	2 46.082	2 55.938	3 5.795	3 15.651	3 25.508	3 35.364	3 45.220	3 55.077	51	0.140
52	2 46.246	2 56.102	3 5.959	3 15.815	3 25.672	3 35.528	3 45.385	3 55.241	52	0.142
53	2 46.410	2 56.267	3 6.123	3 15.980	3 25.836	3 35.693	3 45.549	3 55.405	53	0.145
54	2 46.574	2 56.431	3 6.287	3 16.144	3 26.000	3 35.857	3 45.713	3 55.570	54	0.148
55	2 46.739	2 56.595	3 6.452	3 16.308	3 26.165	3 36.021	3 45.878	3 55.734	55	0.151
56	2 46.903	2 56.759	3 6.616	3 16.472	3 26.329	3 36.185	3 46.042	3 55.898	56	0.153
57	2 47.067	2 56.924	3 6.780	3 16.637	3 26.493	3 36.350	3 46.206	3 56.063	57	0.156
58	2 47.232	2 57.088	3 6.944	3 16.801	3 26.657	3 36.514	3 46.370	3 56.227	58	0.159
59	2 47.396	2 57.252	3 7.109	3 16.965	3 26.822	3 36.678	3 46.535	3 56.391	59	0.162
Mean Solar.	16^h	17^h	18^h	19^h	20^h	21^h	22^h	23^h	For Seconds.	

TABLE FOR FINDING THE LATITUDE BY AN OBSERVED ALTITUDE OF POLARIS.

Reduce the observed altitude of Polaris to the true altitude.

Reduce the recorded time of observation to local sidereal time.

If the sidereal time is { **less than $1^h\ 17^m.4$, subtract it from $1^h\ 17^m.4$;** **between $1^h\ 17^m.4$ and $13^h\ 17^m.4$, subtract $1^h\ 17^m.4$ from it;** **greater than $13^h\ 17^m.4$, subtract it from $25^h\ 17^m.4$;**

and the remainder is the hour-angle of Polaris.

With this hour-angle take out the correction from Table IV, and add it to or subtract i from the true altitude, according to its sign. The result is the latitude of the place.

***Example.*—1886, November 10, at $9^h\ 29^m\ 29^s$, P. M., mean solar time, in longitude 29° east of Greei wich, suppose the true altitude of Polaris to be 29° 29′: required the latitude of the place.**

	h m s
Local astronomical mean time	9 29 29
Reduction from Table III, for $9^h\ 29^m\ 29^s$	+ 1 34
Greenwich sidereal time of mean noon, November 10, page 183 .	15 18 16
Reduction from Table III, for longitude (= $1^h\ 56^m$ east, or minus)	— 0 19
Sum (having regard to signs) is equal to local sidereal time .	0 49 00
	h m
	1 17.4
Subtract sidereal time	0 49.0
Remainder is equal to hour-angle of Polaris	0 28.4

	° ′
True altitude	+29 29.0
Correction from Table IV. . . .	— 1 17.6
Latitude	+28 11.4

TABLE IV—1886.

Hour-Angle.	0^h		1^h		2^h		3^h		4^h		5^h
m	° ′	′	° ′	′	° ′	′	° ′	′	° ′	′	° ′
0	−1 18.2	0.0	−1 15.5	0.4	−1 7.7	0.9	−0 55.2	1.2	−0 39.1	1.5	−0 20.2
5	1 18.2	0.1	1 15.1	0.5	1 6.8	0.9	0 54.0	1.2	0 37.6	1.5	0 18.6
10	1 18.1	0.1	1 14.6	0.5	1 5.9	0.9	0 52.8	1.2	0 36.1	1.5	0 16.9
15	1 18.0	0.1	1 14.1	0.6	1 5.0	0.9	0 51.6	1.3	0 34.6	1.6	0 15.2
20	−1 17.9	0.2	−1 13.5	0.6	−1 4.1	1.0	−0 50.3	1.3	−0 33.0	1.5	−0 13.5
25	1 17.7	0.2	1 12.9	0.7	1 3.1	1.0	0 49.0	1.4	0 31.5	1.6	0 11.9
30	1 17.5	0.3	1 12.2	0.6	1 2.1	1.1	0 47.6	1.4	0 29.9	1.6	0 10.2
35	1 17.2	0.2	1 11.6	0.7	1 1.0	1.1	0 46.2	1.4	0 28.3	1.6	0 8.5
40	−1 17.0	0.3	−1 10.9	0.8	−0 59.9	1.1	−0 44.8	1.4	−0 26.7	1.6	−0 6.8
45	1 16.7	0.4	1 10.1	0.7	0 58.8	1.2	0 43.4	1.4	0 25.1	1.6	0 5.1
50	1 16.3	0.4	1 9.4	0.8	0 57.6	1.2	0 42.0	1.4	0 23.5	1.6	0 3.4
55	1 15.9	0.4	1 8.6	0.9	0 56.4	1.2	0 40.6	1.5	0 21.9	1.7	−0 1.7
60	−1 15.5		−1 7.7		−0 55.2		−0 39.1		−0 20.2		+0 0.0

Hour-Angle.	6^h		7^h		8^h		9^h		10^h		11^h
m	° ′	′	° ′	′	° ′	′	° ′	′	° ′	′	° ′
0	+0 0.0	1.7	+0 20.2	1.7	+0 39.1	1.5	+0 55.3	1.2	+1 7.7	0.9	+1 15.5
5	0 1.7	1.7	0 21.9	1.6	0 40.6	1.4	0 56.5	1.2	1 8.6	0.8	1 15.9
10	0 3.4	1.7	0 23.5	1.7	0 42.0	1.5	0 57.7	1.1	1 9.4	0.7	1 16.3
15	0 5.1	1.7	0 25.2	1.6	0 43.5	1.4	0 58.8	1.1	1 10.1	0.8	1 16.7
20	+0 6.8	1.7	+0 26.8	1.6	+0 44.9	1.4	+0 59.9	1.1	+1 10.9	0.7	+1 17.0
25	0 8.5	1.7	0 28.4	1.6	0 46.3	1.3	1 1.0	1.1	1 11.6	0.6	1 17.2
30	0 10.2	1.7	0 30.0	1.5	0 47.6	1.4	1 2.1	1.0	1 12.2	0.7	1 17.5
35	0 11.9	1.7	0 31.5	1.5	0 49.0	1.3	1 3.1	1.0	1 12.9	0.6	1 17.7
40	+0 13.6	1.7	+0 33.0	1.6	+0 50.3	1.3	+1 4.1	0.9	+1 13.5	0.6	+1 17.9
45	0 15.3	1.6	0 34.6	1.5	0 51.6	1.2	1 5.0	0.9	1 14.1	0.5	1 18.0
50	0 16.9	1.7	0 36.1	1.5	0 52.8	1.3	1 5.9	0.9	1 14.6	0.5	1 18.1
55	0 18.6	1.6	0 37.6	1.5	0 54.1	1.2	1 6.8	0.9	1 15.1	0.4	1 18.2
60	+0 20.2		+0 39.1		+0 55.3		+1 7.7		+1 15.5		+1 18.2